The Contents of Case 10090798US082903

Qnum	Query	DB Name	Thesaurus	Operator	Plural
Q1	us-5795730-$.did.	USPT	None	ADJ	YES
Q2	dipicolinic acid	USPT	None	ADJ	YES
Q3	calcium chloride near5 solution	USPT	None	ADJ	YES
Q4	((Bacillus or Clostridium or (spore forming bacteria)) near5 (spore near5 germinat$6))	USPT	None	ADJ	YES
Q5	(surfactant or (surface reactiv$5 agent))	USPT	None	ADJ	YES
Q6	(spore near5 germinat$6)near5 (solut$3 or reagent or composition or preparation or method)	USPT	None	ADJ	YES
Q7	dipicolinic acid or DPA	USPT	None	ADJ	YES
Q8	disinfectant or antibacterial agent or bactericidal agent or bacteriostatic agent	USPT	None	ADJ	YES
Q9	(preparation or composition or formulation or reagent or formula$5)	USPT	None	ADJ	YES
Q10	Q3 and Q6	USPT	None	ADJ	YES
Q11	Q5 and Q6	USPT	None	ADJ	YES
Q12	Q7 and Q6	USPT	None	ADJ	YES
Q13	Q11 and Q12	USPT	None	ADJ	YES
Q14	Q11 and Q10	USPT	None	ADJ	YES
Q15	Q12 and Q10	USPT	None	ADJ	YES
Q16	Q2 and Q3	USPT	None	ADJ	YES
Q17	Q11 and Q16	USPT	None	ADJ	YES
Q18	Q12 and Q16	USPT	None	ADJ	YES
Q19	Q14 and Q16	USPT	None	ADJ	YES
Q20	Q10 and Q16	USPT	None	ADJ	YES
Q21	Q7 and Q16	USPT	None	ADJ	YES
Q22	Q6 and Q21	USPT	None	ADJ	YES
Q23	Q9 and Q21	USPT	None	ADJ	YES
Q24	Q9 and Q8	USPT	None	ADJ	YES
Q25	Q6 and Q24	USPT	None	ADJ	YES
Q26	Q23 and Q25	USPT	None	ADJ	YES
Q27	Q23 and Q24	USPT	None	ADJ	YES
Q28	Q25 and Q24	USPT	None	ADJ	YES
Q29	Q28 and Q25	USPT	None	ADJ	YES
Q30	Q23 and Q29	USPT	None	ADJ	YES

Q31	Q21 and Q29	USPT	None	ADJ	YES
Q32	Q16 and Q29	USPT	None	ADJ	YES
Q33	Q14 and Q29	USPT	None	ADJ	YES
Q34	Q12 and Q29	USPT	None	ADJ	YES
Q35	Q10 and Q29	USPT	None	ADJ	YES
Q36	Q1 and Q29	USPT	None	ADJ	YES
Q37	Q1 and Q4	USPT	None	ADJ	YES
Q38	Q29 and Q37	USPT	None	ADJ	YES
Q39	Q28 and Q37	USPT	None	ADJ	YES
Q40	Q23 and Q37	USPT	None	ADJ	YES
Q41	Q4 and Q28	USPT	None	ADJ	YES
Q42	Q29 and Q41	USPT	None	ADJ	YES
Q43	Q24 and Q42	USPT	None	ADJ	YES
Q44	Q23 and Q43	USPT	None	ADJ	YES
Q45	Q21 and Q43	USPT	None	ADJ	YES
Q46	Q16 and Q43	USPT	None	ADJ	YES
Q47	Q14 and Q43	USPT	None	ADJ	YES
Q48	Q12 and Q43	USPT	None	ADJ	YES
Q49	Q10 and Q43	USPT	None	ADJ	YES
Q50	Q37 and Q43	USPT	None	ADJ	YES
Q51	Cetylpyridinium Chloride or Tween 20 or surfactant	USPT	None	ADJ	YES
Q52	Bacullus or B. cereus	USPT	None	ADJ	YES
Q53	spore or endospore	USPT	None	ADJ	YES
Q54	calcium chloride	USPT	None	ADJ	YES
Q55	Q43 and Q51	USPT	None	ADJ	YES
Q56	Q52 and Q53	USPT	None	ADJ	YES
Q57	Q55 and Q56	USPT	None	ADJ	YES
Q58	Q55 and Q54	USPT	None	ADJ	YES
Q59	Q9 and Q58	USPT	None	ADJ	YES
Q60	Q52 and Q59	USPT	None	ADJ	YES
Q61	Bacillus$9 or B. cereus	USPT	None	ADJ	YES
Q62	Q53 and Q61	USPT	None	ADJ	YES
Q63	Q59 and Q62	USPT	None	ADJ	YES
Q64	(sporicidal or endosporicidal) near5 (preparation or formulation or composition)	USPT	None	ADJ	YES
Q65	Q63 and Q64	USPT	None	ADJ	YES
Q66	Q1 and Q65	USPT	None	ADJ	YES
Q67	Q1 and Q62	USPT	None	ADJ	YES
Q68	Q51 and Q54	USPT	None	ADJ	YES
Q69	(("RN-499-83-2") or (2,6-Pyridinedicarboxylic acid) or (2,6-Dicarboxypyridine) or (2,6-Dipicolinic acid) or (6-Carboxypicolinic	USPT	None	ADJ	YES

	acid) or (Dipicolinic acid) or DPA or DPAc or (NSC 176))				
Q70	Q64 and Q69	USPT	None	ADJ	YES
Q71	Q68 and Q70	USPT	None	ADJ	YES
Q72	Q61 and Q64	USPT	None	ADJ	YES
Q73	Q68 and Q72	USPT	None	ADJ	YES
Q74	Q69 and Q72	USPT	None	ADJ	YES
Q75	Q70 and Q74	USPT	None	ADJ	YES
Q76	Q73 and Q75	USPT	None	ADJ	YES
Q77	((Bacillus or Clostridium or (spore forming bacteria)) near5 (spore near5 germinat$6))	JPAB,EPAB,DWPI	None	ADJ	YES
Q78	(spore near5 germinat$6)near5 (solut$3 or reagent or composition or preparation or method)	JPAB,EPAB,DWPI	None	ADJ	YES
Q79	disinfectant or antibacterial agent or bactericidal agent or bacteriostatic agent	JPAB,EPAB,DWPI	None	ADJ	YES
Q80	(preparation or composition or formulation or reagent or formula$5)	JPAB,EPAB,DWPI	None	ADJ	YES
Q81	Cetylpyridinium Chloride or Tween 20 or surfactant or (surface active agent)	JPAB,EPAB,DWPI	None	ADJ	YES
Q82	calcium chloride	JPAB,EPAB,DWPI	None	ADJ	YES
Q83	(("RN-499-83-2") or (2,6-Pyridinedicarboxylic acid) or (2,6-Dicarboxypyridine) or (2,6-Dipicolinic acid) or (6-Carboxypicolinic acid) or (Dipicolinic acid) or DPA or DPAc or (NSC 176))	JPAB,EPAB,DWPI	None	ADJ	YES
Q84	Bacillus$9 or B. cereus	JPAB,EPAB,DWPI	None	ADJ	YES
Q85	spore or endospore	JPAB,EPAB,DWPI	None	ADJ	YES
Q86	(sporicidal or endosporicidal) near5 (preparation or formulation or composition)	JPAB,EPAB,DWPI	None	ADJ	YES
Q87	Q84 and Q85	JPAB,EPAB,DWPI	None	ADJ	YES
Q88	Q77 and Q87	JPAB,EPAB,DWPI	None	ADJ	YES
Q89	Q86 and Q78	JPAB,EPAB,DWPI	None	ADJ	YES
Q90	Q86 and Q85	JPAB,EPAB,DWPI	None	ADJ	YES
Q91	Q78 and Q85	JPAB,EPAB,DWPI	None	ADJ	YES
Q92	Q79 and Q91	JPAB,EPAB,DWPI	None	ADJ	YES
Q93	Q79 and Q90	JPAB,EPAB,DWPI	None	ADJ	YES
Q94	Q91 and Q93	JPAB,EPAB,DWPI	None	ADJ	YES
Q95	Q81 and Q82	JPAB,EPAB,DWPI	None	ADJ	YES
Q96	Q83 and Q95	JPAB,EPAB,DWPI	None	ADJ	YES
Q97	Q83 and Q86	JPAB,EPAB,DWPI	None	ADJ	YES
Q98	Q79 and Q83	JPAB,EPAB,DWPI	None	ADJ	YES
Q99	Q78 and Q79	JPAB,EPAB,DWPI	None	ADJ	YES
Q100	Q78 and Q83	JPAB,EPAB,DWPI	None	ADJ	YES

Q101	Q79 and Q86	JPAB,EPAB,DWPI	None	ADJ	YES
Q102	Q93 and Q101	JPAB,EPAB,DWPI	None	ADJ	YES
Q103	Q98 and Q101	JPAB,EPAB,DWPI	None	ADJ	YES
Q104	Q98 and Q102	JPAB,EPAB,DWPI	None	ADJ	YES
Q105	Q101 and Q102	JPAB,EPAB,DWPI	None	ADJ	YES
Q106	Q82 and Q83	JPAB,EPAB,DWPI	None	ADJ	YES
Q107	Q81 and Q83	JPAB,EPAB,DWPI	None	ADJ	YES
Q108	Q95 and Q107	JPAB,EPAB,DWPI	None	ADJ	YES
Q109	Q95 and Q106	JPAB,EPAB,DWPI	None	ADJ	YES
Q110	Q106 and Q107	JPAB,EPAB,DWPI	None	ADJ	YES
Q111	Q106 and Q105	JPAB,EPAB,DWPI	None	ADJ	YES
Q112	Q107 and Q105	JPAB,EPAB,DWPI	None	ADJ	YES
Q113	Q86	JPAB,EPAB,DWPI	None	ADJ	YES
Q114	Q113 and Q95	JPAB,EPAB,DWPI	None	ADJ	YES
Q115	Q113 and Q106	JPAB,EPAB,DWPI	None	ADJ	YES
Q116	Q113 and Q107	JPAB,EPAB,DWPI	None	ADJ	YES
Q117	Q80 and Q107	JPAB,EPAB,DWPI	None	ADJ	YES
Q118	Q80 and Q106	JPAB,EPAB,DWPI	None	ADJ	YES
Q119	Q117 and Q118	JPAB,EPAB,DWPI	None	ADJ	YES
Q120	((424/602)!.CCLS.)	USPT	None	ADJ	YES
Q121	(((424/613)!.CCLS.))	USPT	None	ADJ	YES
Q122	(((424/629)!.CCLS.))	USPT	None	ADJ	YES
Q123	(((424/93.41)!.CCLS.))	USPT	None	ADJ	YES
Q124	(((424/93.46)!.CCLS.))	USPT	None	ADJ	YES
Q125	(((424/93.461)!.CCLS.))	USPT	None	ADJ	YES
Q126	(((424/93.462)!.CCLS.))	USPT	None	ADJ	YES
Q127	Q120 and Q121	USPT	None	ADJ	YES
Q128	Q120 and Q122	USPT	None	ADJ	YES
Q129	Q124 and Q125	USPT	None	ADJ	YES
Q130	Q126 and Q129	USPT	None	ADJ	YES
Q131	Q120 and Q130	USPT	None	ADJ	YES

Run Case | Update Case | Cancel

Help | Main Menu | Logout

WEST Search History

DATE: Friday, August 29, 2003

Set Name side by side	Query	Hit Count	Set Name result set
DB=USPT; PLUR=YES; OP=ADJ			
L131	L120 and L130	0	L131
L130	L126 and L129	4	L130
L129	L124 and L125	21	L129
L128	L120 and L122	0	L128
L127	L120 and L121	0	L127
L126	(((424/93.462)!.CCLS.))	36	L126
L125	(((424/93.461)!.CCLS.))	209	L125
L124	(((424/93.46)!.CCLS.))	118	L124
L123	(((424/93.41)!.CCLS.))	17	L123
L122	(((424/629)!.CCLS.))	196	L122
L121	(((424/613)!.CCLS.))	223	L121
L120	((424/602)!.CCLS.)	290	L120
DB=JPAB,EPAB,DWPI; PLUR=YES; OP=ADJ			
L119	L117 and L118	0	L119
L118	L80 and L106	2	L118
L117	L80 and L107	9	L117
L116	L113 and L107	0	L116
L115	L113 and L106	0	L115
L114	L113 and L95	0	L114
L113	L86	53	L113
L112	L107 and L105	0	L112
L111	L106 and L105	0	L111
L110	L106 and L107	0	L110
L109	L95 and L106	0	L109
L108	L95 and L107	0	L108
L107	L81 and L83	11	L107
L106	L82 and L83	3	L106
L105	L101 and L102	9	L105
L104	L98 and L102	0	L104
L103	L98 and L101	0	L103
L102	L93 and L101	9	L102
L101	L79 and L86	20	L101
L100	L78 and L83	0	L100

L99	L78 and L79	0	L99
L98	L79 and L83	2	L98
L97	L83 and L86	0	L97
L96	L83 and L95	0	L96
L95	L81 and L82	289	L95
L94	L91 and L93	0	L94
L93	L79 and L90	9	L93
L92	L79 and L91	0	L92
L91	L78 and L85	47	L91
L90	L86 and L85	30	L90
L89	L86 and L78	0	L89
L88	L77 and L87	18	L88
L87	L84 and L85	840	L87
L86	(sporicidal or endosporicidal) near5 (preparation or formulation or composition)	53	L86
L85	spore or endospore	5107	L85
L84	Bacillus$9 or B. cereus	14226	L84
L83	(("RN-499-83-2") or (2,6-Pyridinedicarboxylic acid) or (2,6-Dicarboxypyridine) or (2,6-Dipicolinic acid) or (6-Carboxypicolinic acid) or (Dipicolinic acid) or DPA or DPAc or (NSC 176))	486	L83
L82	calcium chloride	8889	L82
L81	Cetylpyridinium Chloride or Tween 20 or surfactant or (surface active agent)	135871	L81
L80	(preparation or composition or formulation or reagent or formula$5)	2347343	L80
L79	disinfectant or antibacterial agent or bactericidal agent or bacteriostatic agent	23207	L79
L78	(spore near5 germinat$6)near5 (solut$3 or reagent or composition or preparation or method)	47	L78
L77	((Bacillus or Clostridium or (spore forming bacteria)) near5 (spore near5 germinat$6))	26	L77
DB=USPT; PLUR=YES; OP=ADJ			
L76	L73 and L75	0	L76
L75	L70 and L74	6	L75
L74	L69 and L72	6	L74
L73	L68 and L72	2	L73
L72	L61 and L64	48	L72
L71	L68 and L70	0	L71
L70	L64 and L69	6	L70
L69	(("RN-499-83-2") or (2,6-Pyridinedicarboxylic acid) or (2,6-Dicarboxypyridine) or (2,6-Dipicolinic acid) or (6-Carboxypicolinic acid) or (Dipicolinic acid) or DPA or DPAc or	2442	L69

	(NSC 176))		
L68	L51 and L54	7351	L68
L67	L1 and L62	1	L67
L66	L1 and L65	0	L66
L65	L63 and L64	1	L65
L64	(sporicidal or endosporicidal) near5 (preparation or formulation or composition)	73	L64
L63	L59 and L62	1	L63
L62	L53 and L61	4580	L62
L61	Bacillus$9 or B. cereus	21361	L61
L60	L52 and L59	0	L60
L59	L9 and L58	1	L59
L58	L55 and L54	1	L58
L57	L55 and L56	0	L57
L56	L52 and L53	3	L56
L55	L43 and L51	1	L55
L54	calcium chloride	28833	L54
L53	spore or endospore	13962	L53
L52	Bacullus or B. cereus	6	L52
L51	Cetylpyridinium Chloride or Tween 20 or surfactant	129270	L51
L50	L37 and L43	0	L50
L49	L10 and L43	0	L49
L48	L12 and L43	0	L48
L47	L14 and L43	0	L47
L46	L16 and L43	0	L46
L45	L21 and L43	0	L45
L44	L23 and L43	0	L44
L43	L24 and L42	1	L43
L42	L29 and L41	1	L42
L41	L4 and L28	1	L41
L40	L23 and L37	0	L40
L39	L28 and L37	0	L39
L38	L29 and L37	0	L38
L37	L1 and L4	1	L37
L36	L1 and L29	0	L36
L35	L10 and L29	0	L35
L34	L12 and L29	0	L34
L33	L14 and L29	0	L33
L32	L16 and L29	0	L32
L31	L21 and L29	0	L31

L30	L23 and L29	0	L30
L29	L28 and L25	9	L29
L28	L25 and L24	9	L28
L27	L23 and L24	0	L27
L26	L23 and L25	0	L26
L25	L6 and L24	9	L25
L24	L9 and L8	18875	L24
L23	L9 and L21	4	L23
L22	L6 and L21	0	L22
L21	L7 and L16	4	L21
L20	L10 and L16	0	L20
L19	L14 and L16	0	L19
L18	L12 and L16	0	L18
L17	L11 and L16	0	L17
L16	L2 and L3	4	L16
L15	L12 and L10	0	L15
L14	L11 and L10	1	L14
L13	L11 and L12	0	L13
L12	L7 and L6	1	L12
L11	L5 and L6	21	L11
L10	L3 and L6	1	L10
L9	(preparation or composition or formulation or reagent or formula$5)	979848	L9
L8	disinfectant or antibacterial agent or bactericidal agent or bacteriostatic agent	21972	L8
L7	dipicolinic acid or DPA	2224	L7
L6	(spore near5 germinat$6)near5 (solut$3 or reagent or composition or preparation or method)	70	L6
L5	(surfactant or (surface reactiv$5 agent))	119322	L5
L4	((Bacillus or Clostridium or (spore forming bacteria)) near5 (spore near5 germinat$6))	52	L4
L3	calcium chloride near5 solution	6197	L3
L2	dipicolinic acid	536	L2
L1	us-5795730-$.did.	1	L1

END OF SEARCH HISTORY

```
=> e dipicolinic acid/cn
E1        1    DIPICOLINATE SYNTHASE, B SUBUNIT (BACILLUS ANTHRACIS STRAIN
               AMES GENE SPOVFB)/CN
E2        1    DIPICOLINEDIHYDROXAMIC ACID/CN
E3        1 --> DIPICOLINIC ACID/CN
E4        1    DIPICOLINIC ACID 1-OXIDE/CN
E5        1    DIPICOLINIC ACID BIS(BENZYLIDENEHYDRAZIDE)/CN
E6        1    DIPICOLINIC ACID DIAMYL ESTER/CN
E7        1    DIPICOLINIC ACID DIBUTYL ESTER/CN
E8        1    DIPICOLINIC ACID DIETHYL ESTER/CN
E9        1    DIPICOLINIC ACID DIMETHYL ESTER/CN
E10       1    DIPICOLINIC ACID DIPROPYL ESTER/CN
E11       1    DIPICOLINIC ACID MONOHYDRATE/CN
E12       1    DIPICOLINIC ACID N-OXIDE/CN

=> s e3
L1        1 "DIPICOLINIC ACID"/CN

=> d

L1  ANSWER 1 OF 1  REGISTRY  COPYRIGHT 2003 ACS on STN
RN  499-83-2  REGISTRY
CN  2,6-Pyridinedicarboxylic acid (8CI, 9CI)  (CA INDEX NAME)
OTHER NAMES:
CN  2,6-Dicarboxypyridine
CN  2,6-Dipicolinic acid
CN  6-Carboxypicolinic acid
CN  ***Dipicolinic acid***
CN  DPA
CN  DPAc
CN  NSC 176
FS  3D CONCORD
MF  C7 H5 N O4
CI  COM
LC  STN Files:  AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN*, BIOBUSINESS, BIOSIS,
    BIOTECHNO, CA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CHEMCATS,
    CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, CSNB, DDFU, DRUGU, EMBASE, GMELIN*,
    HODOC*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MSDS-OHS, PIRA, PROMT,
    SPECINFO, SYNTHLINE, TOXCENTER, USPAT2, USPATFULL
      (*File contains numerically searchable property data)
   Other Sources:  DSL**, EINECS**, TSCA**


=> sel name l1
E1 THROUGH E8 ASSIGNED

=> index bioscience

=> s e1-8
       8  FILE ADISCTI
       1  FILE ADISINSIGHT
       3  FILE ADISNEWS
     171  FILE AGRICOLA
     119  FILE ANABSTR
```

35 FILE AQUASCI
6 FILES SEARCHED...
73 FILE BIOBUSINESS
1457 FILE BIOSIS
55 FILE BIOTECHABS
55 FILE BIOTECHDS
11 FILES SEARCHED...
288 FILE BIOTECHNO
12 FILES SEARCHED...
511 FILE CABA
77 FILE CANCERLIT
6235 FILE CAPLUS
15 FILES SEARCHED...
47 FILE CEABA-VTB
2 FILE CEN
41 FILE CIN
25 FILE CONFSCI
12 FILE CROPB
107 FILE CROPU
40 FILE DDFB
226 FILE DDFU
65 FILE DGENE
24 FILES SEARCHED...
40 FILE DRUGB
3 FILE DRUGLAUNCH
3 FILE DRUGMONOG2
320 FILE DRUGU
11 FILE EMBAL
1241 FILE EMBASE
394 FILE ESBIOBASE
33 FILES SEARCHED...
39 FILE FEDRIP
1 FILE FOMAD
67 FILE FROSTI
160 FILE FSTA
73597 FILE GENBANK
39 FILES SEARCHED...
15 FILE HEALSAFE
329 FILE IFIPAT
325 FILE JICST-EPLUS
9 FILE KOSMET
425 FILE LIFESCI
44 FILES SEARCHED...
1271 FILE MEDLINE
33 FILE NIOSHTIC
809 FILE NTIS
1 FILE NUTRACEUT
15 FILE OCEAN
1477 FILE PASCAL
51 FILES SEARCHED...
1 FILE PHAR
1 FILE PHARMAML
22 FILE PHIN
1081 FILE PROMT

```
      6  FILE RDISCLOSURE
   2635  FILE SCISEARCH
 59 FILES SEARCHED...
      8  FILE SYNTHLINE
    755  FILE TOXCENTER
   3046  FILE USPATFULL
 62 FILES SEARCHED...
     96  FILE USPAT2
      1  FILE VETB
      7  FILE VETU
    449  FILE WPIDS
 66 FILES SEARCHED...
    449  FILE WPINDEX

 60 FILES HAVE ONE OR MORE ANSWERS
L2  QUE ("DIPICOLINIC ACID"/BI OR DPA/BI OR DPAC/BI OR "NSC 176"/BI OR "2,6-DI
      CARBOXYPYRIDINE"/BI OR "2,6-DIPICOLINIC ACID"/BI OR "2,6-PYRIDINEDICAR
      BOXYLIC ACID"/BI OR "6-CARBOXYPICOLINIC ACID"/BI)

L3  QUE (SPORE OR ENDOSPORE) (S) GERMINAT? 53 FILES HAVE ONE OR MORE ANSWERS

L4  QUE (SPORE OR ENDOSPORE) (10A) GERMINAT ? 53 FILES HAVE ONE OR MORE ANSWERS

L5  QUE (SPORE OR ENDOSPORE) (5A) GERMINAT? 52 FILES HAVE ONE OR MORE ANSWERS

L6  QUE L2(5A) L5, 24 FILES HAVE ONE OR MORE ANSWERS

L7  QUE L6 AND PY<2002,20 FILES HAVE ONE OR MORE ANSWERS

=> d rank
F1       49  CAPLUS
F2       14  BIOSIS
F3       12  MEDLINE
F4        7  LIFESCI
F5        7  TOXCENTER
F6        6  SCISEARCH
F7        5  EMBASE
F8        4  ESBIOBASE
F9        4  PASCAL
F10       3  BIOTECHNO
F11       3  FSTA
F12       2  AGRICOLA
F13       1  BIOBUSINESS
F14       1  CABA
F15       1  DDFB
F16       1  DRUGB
F17       1  DRUGU
F18       1  FROSTI
F19       1  KOSMET
F20       1  PROMT

L8      123 L7
L9       66 DUP REM L8 (57 DUPLICATES REMOVED)
L9  ANSWER 1 OF 66  CAPLUS  COPYRIGHT 2003 ACS on STN DUPLICATE 1
```

AN 2001:170033 CAPLUS
DN 134:337638
TI Role of dipicolinic acid in survival of Bacillus subtilis spores exposed to artificial and solar UV radiation
AU Slieman, Tony A.; Nicholson, Wayne L.
CS Department of Veterinary Science and Microbiology, University of Arizona, Tucson, AZ, 85721, USA
SO Applied and Environmental Microbiology (***2001***), 67(3), 1274-1279
CODEN: AEMIDF; ISSN: 0099-2240
PB American Society for Microbiology
DT Journal
LA English
AB Pyridine-2,6-dicarboxylic acid (dipicolinic acid [DPA]) constitutes approx. 10% of Bacillus subtilis spore dry wt. and has been shown to play a significant role in the survival of B. subtilis spores exposed to we heat and to 254-nm UV radiation in the lab. However, to date, no work has addressed the importance of DPA in the survival of spores exposed to environmentally relevant solar UV radiation. Air-dried films of spores contg. DPA or lacking DPA due to a null mutation in the DPA synthetase operon dpaAB were assayed for their resistance to UV-C (254 nm), UV-B (290 to 320 nm), full-spectrum sunlight (290 to 400 nm), and sunlight from which the UB-B portion was filtered (325 to 400 nm). In all cases, air-dried DPA-less spores were significantly more UV sensitive than their isogenic DPA-contg. counterparts. However, the degree of difference in UV resistance between the two strains was wavelength dependent, being greatest in response to radiation in the UV-B portion of the spectrum. In addn., the inactivation responses of DPA-contg. and DPA-less spores also depended strongly upon whether spores were exposed to UV as air-dried films or in aq. suspension. Spores lacking the gerA, gerB, and gerK nutrient germination pathways, and which therefore rely on chem. triggering of germination by the calcium chelate of DPA (Ca-DPA), were also more UV sensitive than wild-type spores to all wavelengths tested, suggesting that the Ca- ***DPA*** -mediated ***spore*** ***germination*** pathway may consist of a UV-sensitive component or components.
RE.CNT 37 THERE ARE 37 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 2 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 2
AN 2002:28711 CAPLUS
DN 136:213438
TI Analysis of the killing of spores of Bacillus subtilis by a new disinfectant, Sterilox
AU Loshon, C. A.; Melly, E.; Setlow, B.; Setlow, P.
CS Department of Biochemistry, University of Connecticut Health Center, Farmington, CT, 06032, USA
SO Journal of Applied Microbiology (***2001***), 91(6), 1051-1058
CODEN: JAMIFK; ISSN: 1364-5072
PB Blackwell Science Ltd.
DT Journal
LA English
AB The aim of this study was to det. the mechanism whereby the new disinfectant Sterilox kills spores of Bacillus subtilis. Bacillus subtilis spores were readily killed by Sterilox, and spore resistance to

this agent was due in large part to the spore coats. Spore killing by Sterilox was not through DNA damage, released essentially no spore dipicolinic acid, and Sterilox-killed spores underwent the early steps in ***spore*** ***germination*** , including ***dipicolinic*** ***acid*** release, cortex degrdn., and initiation of metab. However, these germinated spores never swelled, and many had altered permeability properties. It is suggested that Sterilox treatment kills dormant spores by oxidatively modifying the inner membrane of the spores such that this membrane becomes non-functional in the germinated spore leading to spore death.

RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 3 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 3
AN 2000:688830 CAPLUS
DN 133:360652
TI Characterization of spores of Bacillus subtilis which lack dipicolinic acid
AU Paidhungat, Madan; Setlow, Barbara; Driks, Adam; Setlow, Peter
CS Department of Biochemistry, University of Connecticut Health Center, Farmington, CT, 06032, USA
SO Journal of Bacteriology (***2000***), 182(19), 5505-5512
CODEN: JOBAAY; ISSN: 0021-9193
PB American Society for Microbiology
DT Journal
LA English
AB Spores of Bacillus subtilis with a mutation in spoVF cannot synthesize dipicolinic acid (DPA) and are too unstable to be purified and studied in detail. However, the spores of a strain lacking the three major germinant receptors (termed .DELTA.ger3), as well as spoVF, can be isolated, although they spontaneously germinate much more readily than .DELTA.ger3 spores. The .DELTA.ger3 spoVF spores lack DPA and have higher levels of core water than .DELTA.ger3 spores, although sporulation with DPA restores close to normal levels of DPA and core water to .DELTA.ger3 spoVF spores. The DPA-less spores have normal cortical and coat layers, as obsd. with an electron microscope, but their core region appears to be more hydrated than that of spores with DPA. The .DELTA.ger3 spoVF spores also contain minimal levels of the processed active form (termed P41) of the germination protease, GPR, a finding consistent with the known requirement for DPA and dehydration for GPR autoprocessing. However, any P41 formed in .DELTA.ger3 spoVF spores may be at least transiently active on one of this protease's small acid-sol. spore protein (SASP) substrates, SASP-.gamma.. Anal. of the resistance of wild-type, .DELTA.ger3, and .DELTA.ger3 spoVF spores to various agents led to the following conclusions: (i) DPA and core water content play no role in spore resistance to dry heat, dessication, or glutaraldehyde; (ii) an elevated core water content is assocd. with decreased spore resistance to wet heat, hydrogen peroxide, formaldehyde, and the iodine-based disinfectant Betadine; (iii) the absence of DPA increases spore resistance to UV radiation; and (iv) wild-type spores are more resistant than .DELTA.ger3 spores to Betadine and glutaraldehyde. These results are discussed in view of current models of spore resistance and spore germination.

RE.CNT 43 THERE ARE 43 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 4 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 4
AN 2000:269714 CAPLUS
DN 133:28363
TI Role of ger proteins in nutrient and nonnutrient triggering of spore germination in Bacillus subtilis
AU Paidhungat, Madan; Setlow, Peter
CS Department of Biochemistry, University of Connecticut Health Center, Farmington, CT, USA
SO Journal of Bacteriology (***2000***), 182(9), 2513-2519
CODEN: JOBAAY; ISSN: 0021-9193
PB American Society for Microbiology
DT Journal
LA English
AB Dormant Bacillus subtilis spores germinate in the presence of particular nutrients called germinants. The spores are thought to recognize germinants through receptor proteins encoded by the gerA family of operons, which includes gerA, gerB, and gerK. We sought to substantiate this putative function of the GerA family proteins by characterizing spore germination in a mutant strain that contained deletions at all known gerA-like loci. As expected, the mutant spores germinated very poorly in a variety of rich media. In contrast, they germinated like wild-type spores in a chem. germinant, a 1-1 chelate of Ca2+ and dipicolinic acid (DPA). These observations showed that proteins encoded by gerA family members are required for nutrient-induced germination but not for chem.-triggered germination, supporting the hypothesis that the GerA family encodes receptors for nutrient germinants. Further characterization of Ca2+-DPA-induced germination showed that the effect of Ca2+- ***DPA*** on ***spore*** ***germination*** was satd. at 60 mM and had a Km of 30 mM. We also found that decoating ***spores*** abolished their ability to ***germinate*** in Ca2+- ***DPA*** but not in nutrient germinants, indicating that Ca2+-DPA and nutrient germinants probably act through parallel arms of the germination pathway.
RE.CNT 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 5 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 5
AN 1999:714833 CAPLUS
DN 132:75561
TI Dipicolinic acid (DPA) assay revisited and appraised for spore detection
AU Hindle, Alistair A.; Hall, Elizabeth A. H.
CS Inst. Biotechnol., University of Cambridge, Cambridge, CB2 1QT, UK
SO Analyst (Cambridge, United Kingdom) (***1999***), 124(11), 1599-1604
CODEN: ANALAO; ISSN: 0003-2654
PB Royal Society of Chemistry
DT Journal
LA English
AB Delayed gate fluorescence detection of dipicolinic acid (DPA), a universal and specific component of bacterial spores, has been appraised for use in a rapid anal. method for the detection of low concns. of bacterial spores. DPA was assayed by fluorimetric detection of its chelates with lanthanide metals. The influence of the choice and concn. of lanthanide and buffer ions on the fluorescence assay was studied as well as the effects of pH and temp. The optimal system quantified the fluorescence of terbium

monodipicolinate in a soln. of 10 .mu.M terbium chloride buffered with 1 M sodium acetate, pH 5.6 and had a detection limit of 2 nM DPA. This assay allowed the first real-time monitoring of the ***germination*** of bacterial ***spores*** by continuously quantifying exuded ***DPA*** . A detection limit of 104 Bacillus subtilis spores ml-1 was reached, representing a substantial improvement over previous rapid tests.
RE.CNT 51 THERE ARE 51 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 6 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 6
AN 1999:40192 CAPLUS
DN 130:194083
TI Relationship between heat-resistance, dipicolinic acid (DPA) content, and germination properties of Clostridium perfringens type A spores
AU Doi, Hiroyasu; Oka, Shigemi; Takama, Kozo; Tsuzuki, Toshifumi
CS Fac. Fish., Hokkaido Univ., Hakodate, 041-8611, Japan
SO Hokkaido Daigaku Suisangakubu Kenkyu Iho (***1998***), 49(3), 165-171
CODEN: HOSGAD; ISSN: 0018-3458
PB Hokkaido Daigaku Suisangakubu
DT Journal
LA English
AB The relationship between the D95 (decimal redn. times)-value, DPA (dipicolinic acid) content and germination properties of five strains including clin. and wild type strains of Olostridium perfringens type A spores were investigated in this study. Based on the D95-value of spores, the strains could be clearly classified as heat-stable, D95 3 5.3-22.1, i,e., strains NCTC 8238 and NCTC 8239 and heat-labile, D95 2.5-1.2, i.e., strains HS-13-1, S-40 and RW-18. DPA contained more than 7.5% for the heat-stable strains, whereas the heat-labile strains had less than 6.0% of DPA in their spores. This suggested that the DPA content of spores coincided with the heat resistance of spores. Moreover, the germination properties in two different mediums were used to est. the heat resistance of five strains of spores. The heated spores of the heat-stable strains germinated sufficiently in K-medium; however, the spores of heat-labile strains germinated scarcely in the same medium. These results shows that DPA content or germination properties had highly relationship with D95-value regarding to the heat resistance of C. perfringenes spores.

L9 ANSWER 7 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 7
AN 1997:7737 CAPLUS
DN 126:57295
TI Muramic lactam in peptidoglycan of Bacillus subtilis spores is required for spore outgrowth but not for spore dehydration or heat resistance
AU Popham, David L.; Helin, Jari; Costello, Catherine E.; Setlow, Peter
CS Dep. Biochem., Univ. Connecticut Health Cent., Farmington, CT, 06030-3305, USA
SO Proceedings of the National Academy of Sciences of the United States of America (***1996***), 93(26), 15405-15410
CODEN: PNASA6; ISSN: 0027-8424
PB National Academy of Sciences
DT Journal
LA English
AB Bacterial endospores derive much of their longevity and resistance properties from the relative dehydration of their protoplasts. The spore

cortex, a peptidoglycan structure surrounding the protoplasm, maintains, and is postulated to have a role in attaining, protoplast dehydration. A structural modification unique to the spore cortex is the removal of all or part of the peptide side chains from the majority of the muramic acid residues and the conversion of 50% of the muramic acid to muramic lactam. A mutation in the cwlD gene of Bacillus subtilis, predicted to encode a muramoyl-L-alanine amidase, results in the prodn. of spores contg. no muramic lactam. These spores have normally dehydrated protoplasts but are unable to complete the germination/outgrowth process to produce viable cells. Addn. of germinants resulted in the triggering of ***germination*** with loss of ***spore*** refractivity and the release of ***dipicolinic*** ***acid*** but no degrdn. of cortex peptidoglycan. Germination in the presence of lysozyme allowed the cwlD spores to produce viable cells and showed that they have normal heat resistance properties. These results (i) suggest that a mech. activity of the cortex peptidoglycan is not required for the generation of protoplast dehydration but rather that it simply serves as a static structure to maintain dehydration, (ii) demonstrate that degrdn. of cortex peptidoglycan is not required for spore solute release or partial spore core rehydration during germination, (iii) indicate that muramic lactam is a major specificity determinant of generation lytic enzymes, and (i.v.) suggest the mechanism by which the spore cortex is degraded during germination while the germ cell wall is left intact.

L9 ANSWER 8 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 10
AN 1986:105956 CAPLUS
DN 104:105956
TI Mechanism of calcium and ***dipicolinic*** ***acid*** requirement for L-alanine induced ***germination*** of Bacillus cereus BIS-59 ***spores***
AU Kamat, A. S.; Lewis, N. F.; Pradhan, D. S.
CS Biochem. Food Technol. Div., Bhabha At. Res. Cent., Bombay, 400 085, India
SO Microbios (***1985***), 44(177), 33-44
CODEN: MCBIA7; ISSN: 0026-2633
DT Journal
LA English
AB Spores prepd. from different sporulating media contg. varying amts. of Ca and dipicolinic acid (DPA) exhibited differential responses to germination in 0.25M L-alanine. Ca-Spores (spores obtained in a medium contg. CaCl2) with moderately high Ca and ***DPA*** contents could be triggered to ***germination*** by L-alanine, whereas P- ***spores*** (spores obtained in a medium contg. DPA) with low contents of Ca and DPA could not be germinated by L-alanine unless Ca2+ or DPA was exogenously added. The initiation of L-alanine-induced germination by P-spores in the presence of 45CaCl2 was assocd. with a marked uptake of 45Ca2+. Expts. involving stepwise extn. of 45Ca from prelabeled spores indicated that a part of the spore Ca may be involved in L-alanine-induced germination. Both Ca2+ and DPA seemed to have a stimulatory effect on the incorporation of [14C]L-alanine.

L9 ANSWER 9 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 12
AN 1975:493646 CAPLUS
DN 83:93646
TI Modification of the spores of Bacillus anthracoides 96 and changes in the

content of dipicolinic acid in them during germination
AU Bekhtereva, M. N.; Marchenko, I. V.; Galanina, L. A.; Loginova, O. N.
CS Inst. Mikrobiol., Moscow, USSR
SO Mikrobiologiya (***1975***), 44(2), 233-6
CODEN: MIKBA5; ISSN: 0026-3656
DT Journal
LA Russian
AB The level of dipicolinic acid (DPA) in starved cultures of B. anthracoides contg. mostly spores reached 10.7% of dry wt. Thirty min after transfer to a nutrient medium, a distinct change was obsd. in the morphol. picture, with a steep fall in the DPA content to 3.6%. In the following 1-4 hr, a further decrease in DPA was obsd. to 2%.

L9 ANSWER 10 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 13
AN 1972:401215 CAPLUS
DN 77:1215
TI ***Germination*** of bacterial ***spores*** by calcium chelates of ***dipicolinic*** ***acid*** analogs
AU Lewis, James C.
CS West. Reg. Res. Lab., Agric. Res. Serv., Berkeley, CA, USA
SO Journal of Biological Chemistry (***1972***), 247(6), 1861-8
CODEN: JBCHA3; ISSN: 0021-9258
DT Journal
LA English
AB Among 8 Ca salts of analogs of dipicolinic acid (I) [499-83-2] tested for induction of Bacillus megaterium ATCC 10778 spore germination, only 4H-pyran-2,6-dicarboxylic acid (II) [23047-07-6] was as active as I. Calcium 3-methyldipicolinate [34812-34-5] and calcium 4-methyl-4H-pyran-2,6-dicarboxylate [34812-35-6] were active but the germination proceeded less rapidly. In the presence of a threshold concn. (0.020M) of calcium dipicolinate [6893-30-7], calcium pyrimidine-2,4-dicarboxylate [34812-37-8], calcium pyrazine-2,6-dicarboxylate [34812-38-9], calcium 4-hydroxydipicolinate [34812-39-0], and calcium furan-2,5-dicarboxylate [34812-40-3] also showed activity. A hypothesis is proposed for mobilization of native Ca dipicolinate of dormant spores during germination, by way of a dimerization like that exhibited in crystals of Ca dipicolinate trihydrate and the isostructural Ca pyrandicarboxylate trihydrate.

L9 ANSWER 11 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 14
AN 1962:68943 CAPLUS
DN 56:68943
OREF 56:13337d-e
TI ***Germination*** properties of ***spores*** with low ***dipicolinic*** ***acid*** content
AU Keynan, A.; Murrell, W. G.; Halvorson, H. O.
CS Univ. of Wisconsin, Madison
SO Journal of Bacteriology (***1962***), 83, 395-9
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA Unavailable
AB When the dipicolinic acid content of spores of Bacillus cereus strain T is reduced from 7.5 to 2 or 3%, the spores germinate spontaneously after heat activation and are sluggish in their response to L-alanine and other

germination agents. Only germination initiated by calcium dipicolinic acid is unaffected. L-Alanine-induced germination is stimulated by exogenous dipicolinic acid. These results support the hypothesis that endogenous dipicolinic acid regulates the L-alanine-triggered germination.

L9 ANSWER 12 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 15
AN 1962:55862 CAPLUS
DN 56:55862
OREF 56:10673g-h
TI Calcium ***dipicolinic*** ***acid*** -induced ***germination*** of Bacillus cereus ***spores***
AU Keynan, A.; Halvorson, H. O.
CS Univ. of Wisconsin, Madison
SO Journal of Bacteriology (***1962***), 83, 100-5
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA Unavailable
AB The germination of spores of B. cereus strain T can be initiated by Ca dipicolinic acid (I). The kinetics of germination are characterized by a long lag period followed by a rapid loss of refractility. The lag period displays the temp. dependence of a metabolic reaction, whereas the rate of germination is relatively independent of temp. Germination induced by I is insensitive to L-alanine analogs, is sensitive to metabolic poisons, and proceeds without a detectable activation stage. It was concluded that I-induced germination has a metabolic basis and differs, at least in its initial phases, from L-alanine-induced germination.

L9 ANSWER 13 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN DUPLICATE 16
AN 1961:106522 CAPLUS
DN 55:106522
OREF 55:20087c-e
TI ***Germination*** of bacterial ***endospores*** with calcium and ***dipicolinic*** ***acid***
AU Riemann, Hans; Ordal, John Z.
CS Univ. of Illinois, Urbana
SO Science (Washington, DC, United States) (***1961***), 133, 1703-4
CODEN: SCIEAS; ISSN: 0036-8075
DT Journal
LA Unavailable
AB Dipicolinic acid (DPA) was dissolved in NaOH until neutrality resulted; standard CaCl2 with or without tris(hydroxymethyl)aminomethane buffer was added just before addn. of the mixt. to the spore suspension. Spores of putrefactive anaerobes 3679 (NCA and h strains) and S2, Clostridium perfringens, Bacillus cereus, B. megaterium, B. mycoides, B. subtilis, and B. coagulans were germinated by this method. Metal ions Na, K, Mg, Mn, Ba, Co, Zn, Cu, Ni, and Fe could not be substituted for Ca, nor could other chelating agents or any of the pyridine dicarboxylic acids be substituted for DPA. Germination readily took place in a molar ratio of Ca to DPA of 1:1 over a pH range of 5 to 9 and was most rapid at pH 7.0. A temp. of 45.degree. was optimum for the clostridial spores, whereas 35.degree. was optimum for aerobic spores. The mechanism by which a mixt. of Ca and DPA induces germination could not be explained.

L9 ANSWER 14 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN

AN 2001:676704 CAPLUS
DN 135:246930
TI Control of spore forming bacteria
IN Breen, Alexander W.; Taylor, Charles; Smith, Kelly S.
PA Hercules Incorporated, USA
SO PCT Int. Appl., 32 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2001066471	A2	20010913	WO 2001-US6132	20010223 <--
WO 2001066471	A3	20020221		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PRAI US 2000-521422 A 20000308
AB Methods for controlling spores in aq. systems, esp. closed systems. These methods include contacting germinating agent with an aq. closed system for a sufficient period of time and under non-hostile conditions so that spores capable of germinating can germinate into vegetative cells, and subjecting the germinated vegetative cells to biocidal treatment. These methods also include contacting germinating agent with the aq. system for a sufficient period of time and under non-hostile conditions so that spores capable of germinating can germinate into vegetative cells, subjecting the germinated vegetative cells to biocidal treatment in a hostile environment; and cycling between hostile and non-hostile environments. The closed aq. system preferably comprises a pulping or papermaking system.

L9 ANSWER 15 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 2001:576762 CAPLUS
DN 135:285541
TI Genetic requirements for induction of germination of spores of Bacillus subtilis by Ca2+-dipicolinate
AU Paidhungat, Madan; Ragkousi, Katerina; Setlow, Peter
CS Department of Biochemistry, University of Connecticut Health Center, Farmington, CT, 06032, USA
SO Journal of Bacteriology (***2001***), 183(16), 4886-4893
CODEN: JOBAAY; ISSN: 0021-9193
PB American Society for Microbiology
DT Journal
LA English
AB Dormant Bacillus subtilis spores can be induced to germinate by nutrients, as well as by nonmetabolizable chems., such as a 1:1 chelate of Ca2+ and dipicolinic acid (DPA). Nutrients bind receptors in the spore, and this binding triggers events in the spore core, including DPA excretion and

rehydration, and also activates hydrolysis of the surrounding cortex through mechanisms that are largely unknown. As Ca2+-DPA does not require receptors to induce spore germination, we asked if this process utilizes other proteins, such as the putative cortex-lytic enzymes SleB and CwlJ, that are involved in nutrient-induced germination. The authors found that Ca2+-DPA triggers germination by first activating CwlJ-dependent cortex hydrolysis; this mechanism is different from nutrient-induced germination where cortex hydrolysis is not required for the early germination events in the spore core. Nevertheless, since nutrients can induce release of the spore's DPA before cortex hydrolysis, we examd. if the DPA excreted from the core acts as a signal to activate CwlJ in the cortex. Indeed, endogenous DPA is required for nutrient-induced CwlJ activation and this requirement was partially remedied by exogenous Ca2+-DPA. These findings thus define a mechanism for Ca2+-DPA-induced germination and also provide the first definitive evidence for a signaling pathway that activates cortex hydrolysis in response to nutrients.

RE.CNT 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 16 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1999:689857 CAPLUS
DN 132:61536
TI High pressure inactivation of anaerobic spores from Clostridium pasteurianum
AU Holters, C.; Van Almsick, G.; Ludwig, H.
CS Institut fur Pharmazeutische Technologie und Biopharmazie, Gruppe, Universitat Heidelberg, Heidelberg, D-69120, Germany
SO Advances in High Pressure Bioscience and Biotechnology, Proceedings of the International Conference -- Heidelberg, Aug. 30-Sept. 3, 1998 (***1999***), Meeting Date 1998, 65-68. Editor(s): Ludwig, Horst. Publisher: Springer-Verlag, Berlin, Germany.
CODEN: 68IFAH
DT Conference
LA English
AB The pressure-induced germination and inactivation of Clostridium pasteurianum spores are investigated. The germination is followed by the release of dipicolinic acid (DPA). Temp. has only a minor effect on the DPA release. At 60 .degree.C and with pressures above 400 MPa, almost complete DPA release is obtained within 15 min. From the results of the germination expts., an effective process is derived to inactivate the spores using oscillatory pressures.

RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 17 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1998:602030 CAPLUS
DN 129:287682
TI Comparative study of pressure-induced germination of Bacillus subtilis spores at low and high pressures
AU Wuytack, Elke Y.; Boven, Steven; Michiels, Chris W.
CS Laboratory of Food Microbiology, Katholieke Universiteit Leuven, Louvain, Belg.
SO Applied and Environmental Microbiology (***1998***), 64(9), 3220-3224
CODEN: AEMIDF; ISSN: 0099-2240

PB American Society for Microbiology
DT Journal
LA English
AB We have studied pressure-induced germination of Bacillus subtilis spores at moderate (100 MPa) and high (500 to 600 MPa) pressures. Although we found comparable germination efficiencies under both conditions by using heat sensitivity as a criterion for germination, the sensitivity of pressure-germinated spores to some other agents was found to depend on the pressure used. Spores germinated at 100 MPa were more sensitive to pressure (>200 MPa), UV light, and hydrogen peroxide than were those germinated at 600 MPa. Since small, acid-sol. proteins (SASPs) and dipicolinic acid (DPA) are known to be involved in spore resistance to UV light and hydrogen peroxide, we studied the fate of these compds. during pressure germination. DPA was released upon both low- and high-pressure germination, but SASP degrdn., which normally accompanies nutrient-induced germination, occurred upon low-pressure germination but not upon high-pressure germination. These results adequately explain the UV and hydrogen peroxide resistance of spores germinated at 600 MPa. The resistance to pressure inactivation of 600-MPa-germinated spores could also, at least partly, be attributed to .alpha./.beta.-type SASPs, since mutants deficient in .alpha./.beta.-type SASPs were more sensitive to inactivation at 600 MPa. Further, germination at 100 MPa resulted in rapid ATP generation, as is the case in nutrient-induced germination, but no ATP was formed during germination at 600 MPa. These results suggest that spore germination can be initiated by low- and high-pressure treatments but is arrested at an early stage in the latter case. The implications for the use of high pressure as a preservation treatment are discussed.
RE.CNT 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L9 ANSWER 18 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1997:332211 CAPLUS
DN 127:63009
TI Release of dipicolinic acid and amino acids during high pressure treatment of Bacillus subtilis spores
AU Sojka, Bernd; Ludwig, Horst
CS Inst. Pharmazeutische Technologie Biopharmazie, Univ. Heidelberg, Heidelberg, D-69120, Germany
SO Pharmazeutische Industrie (***1997***), 59(4), 355-359
CODEN: PHINAN; ISSN: 0031-711X
PB Cantor
DT Journal
LA English
AB The pressure-induced germination of Bacillus subtilis spores was followed by measuring the release of dipicolinic acid (DPA) and amino acids. No DPA release was obsd. at 30.degree. and pressures below 50 MPa while a slight pressure rise led to maximal DPA exudation. The rate was highest at 110 MPa. Elevated temps. (40 and 50.degree.) led to maximal germination at decreased pressures of 40 and 30 MPa, resp. DPA release kinetics were measured at 110 MPa and 30, 40, and 50.degree. showing exudation to be temp.-dependent and following a first-order rate law after a preceding lag phase. At 60 MPa and 30.degree. conformational changes of spore proteins accompanied DPA release after a 10 min lag time. Amino

acid release was much slower than DPA exudation and release was further delayed by amino acids in the medium. DPA release but not amino acid exudation was shown to be a diffusion-controlled process.

L9 ANSWER 19 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1990:4281 CAPLUS
DN 112:4281
TI Biochemical analysis of the Bacillus subtilis 1604 spore germination response
AU Venkatasubramanian, Padmavathy; Johnstone, Keith
CS Dep. Bot., Univ. Cambridge, Cambridge, CB2 3EA, UK
SO Journal of General Microbiology (***1989***), 135(10), 2723-33
CODEN: JGMIAN; ISSN: 0022-1287
DT Journal
LA English
AB Germination at 37.degree. of spores of B. subtilis 1604 in the L-alanine and potassium phosphate (ALA) and the glucose, fructose, L-asparagine, KCl (GFAK) germinant systems was triggered following heat activation at 73.degree. for 1 h. In these conditions, 50% of the spore population became committed to germinate after exposure for 10 min and 14 min to ALA and GFAK, resp., at which time 38% and 30% losses of OD600 had taken place. Dipicolinic acid (DPA) release, loss of heat resistance, and release of sol. hexosamine-contg. fragments occurred after commitment and were closely assocd. with loss of refractility in both the ALA and GFAK pathways. Net ATP synthesis could not be detected until 3-4 min after initiation of germination in both ALA and GFAK, by which time >20% of the spore population was committed to germinate. The ALA and GFAK germination pathways were >99% inhibited by 3 and 1 mM HgCl2, resp., as measured by OD600 loss. Reversible post-commitment HgCL2-sensitive sites were present in the ALA and GFAK pathways which were 50% inhibited by 0.125 mM and 0.05 mM HgCl2, resp. A pre-commitment HgCl2-sensitive site was identified in the ALA pathway which was 55% inhibited by 6 mM HgCl2. At 3 mM HgCl2, 70% of the spore population became committed to germinate in the ALA pathway, whereas <5% OD600 loss occurred. In this system, loss of heat resistance was assocd. with commitment, whereas OD600 loss and DPA release were identified as post-commitment events. The ALA and GFAK pathways were insensitive to a variety of metabolic inhibitors. Protease inhibitors had different effects on the ALA and GFAK pathways: phenylmethanesulfonyl fluoride solely inhibited ALA germination at a pre-commitment site and had little effect on GFAK germination, whereas Na-p-tosyl-L-arginine Me ester inhibited both the ALA and GFAK pathways at pre- and post-commitment sites. These results are discussed in relation to a recently proposed model for the triggering of Bacillus megaterium KM spore germination.

L9 ANSWER 20 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1988:507541 CAPLUS
DN 109:107541
TI ***Germination*** studies on Bacillus ***spores*** : I. Mechanism of calcium and ***dipicolinic*** ***acid*** requirement for L-alanine-induced ***germination*** of Bacillus cereus BIS-59 ***spores***
AU Kamat, A. S.; Lewis, N. F.; Pradhan, D. S.
CS Biochem. Food Technol. Div., Bhabha At. Res. Cent., Bombay, 400 085, India
SO Indian Journal of Microbiology (***1986***), 26(3-4), 265-72

CODEN: IJMBAC; ISSN: 0046-8991
DT Journal
LA English
AB Spores prepd. from different sporulating media contg. varying amts. of Ca and dipicolinic acid (DPA) exhibited a differential response to germination in L-alanine (0.25 M). Ca Spores with moderately high Ca and ***DPA*** contents could be triggered to ***germination*** by L-alanine, whereas P ***spores*** with low contents of Ca and DPA could not be germinated by L-alanine unless Ca2+ or DPA was exogenously added. The initiation of L-alanine-induced germination in P spores in the presence of 45CaCl2 was assocd. with a marked uptake of 45Ca2+. Expts. involving a stepwise extn. of 45Ca from prelabeled spores indicated that a part of the spore calcium may be involved in L-alanine-induced germination. Both Ca2+ and DPA seemed to have a stimulatory effect on the incorporation of 14C L-alanine.

L9 ANSWER 21 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1978:526021 CAPLUS
DN 89:126021
TI Study of calcium dipicolinate release during bacterial spore germination by using a new, sensitive assay for dipicolinate
AU Scott, Ian R.; Ellar, David J.
CS Dep. Biochem., Univ. Cambridge, Cambridge, UK
SO Journal of Bacteriology (***1978***), 135(1), 133-7
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA English
AB The release of Ca and dipicolinic acid (I) from spores of Bacillus megaterium KM during L-alanine-inducing triggering of germination was studied with a new, simple, and rapid assay for I capable of detecting a concn. of 0.5 .mu.M. The release of both Ca and I started within seconds of exposure of the spores to L-alanine, thus preceding other measurable changes assocd. with germination. From the earliest times, the 2 substances were released in equimolar quantities, although later in germination Ca predominated.

L9 ANSWER 22 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1978:472911 CAPLUS
DN 89:72911
TI Sequence of biochemical events during germination of Bacillus megaterium spores
AU Scott, Ian R.; Stewart, Gordon S. A. B.; Koncewicz, Maciej A.; Ellar, David J.; Crafts-Lighty, Anita
CS Dep. Biochem., Univ. Cambridge, Cambridge, UK
SO Spores (***1978***), 7, 95-103
CODEN: SPORAI; ISSN: 0584-9144
DT Journal
LA English
AB During L-alanine-initiated germination of B. megaterium KM spores, no changes in spore amino acids or ATP occurred until 2-3 min after L-alanine addn. Spores contained almost no keto acids (pyruvate, 2-oxoglutarate), malate, or NADH. These compds. were not detectable until 2-3 min into germination. Germination in L-alanine-3H showed that essentially no alanine was metabolized before 3 min. When spores were germinated in 3H2O

to measure any nonexchangeable incorporation of tritium, no radioactivity was incorporated until 2-3 min into germination. The onset of both O uptake and lipid turnover in spores also occurred 2-3 min after addn. of L-alanine, but net lipid synthesis was not detectable until 12 min into germination. Three characteristic germination events, (Ca and dipicolinic acid release and germination commitment) deviated from this general picture and appeared to commence immediately upon exposure to L-alanine. At 37.degree., 50% of spores were committed to germination after only 1.5 min of exposure to L-alanine. The fact that spores were committed to subsequent germination by brief exposure to L-alanine indicates that initial binding of L-alanine triggers an immediate response which does not depend upon its continued presence.

L9 ANSWER 23 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1977:530283 CAPLUS
DN 87:130283
TI Studies on germination of calcium- and zinc-enriched spores of Bacillus cereus T
AU Misra, B. C.; Sharma, D.; Gollakota, K. G.
CS Dep. Chem., Indian Inst. Technol., Kanpur, India
SO Journal of General and Applied Microbiology (***1977***), 23(3), 109-17
CODEN: JGAMA9; ISSN: 0022-1260
DT Journal
LA English
AB The Ca-dipicolinic acid (Ca-DPA) complex in the spores of B. cereus T is believed to play an important role in the phenomenon of heat resistance. Studies were carried out to det. whether Ca was present in the form of a complex with DPA. Ca and DPA are known to be released into the medium following germination. The presence of Ca-DPA complex in the spores can be established, if Ca and DPA are released in the same ratio in which they are present in the spores. Spores were prepd. with different Ca-DPA ratios, and the Ca-DPA ratio during the release was the same as in the spores. Attempts were also made by increasing the Zn concn. in the medium to see whether Zn could replace Ca in Ca-DPA complex. Zn is not taken up by the spores in the presence of Ca.

L9 ANSWER 24 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1977:2069 CAPLUS
DN 86:2069
TI Resistance of Bacillus cereus spores as affected by changes in their exchangeable calcium(2+) content
AU Kovacs-Proszt, Gizella; Farkas, Jozsef
CS Cent. Food Res. Inst., Budapest, Hung.
SO Acta Alimentaria Academiae Scientiarum Hungaricae (***1976***), 5(2), 179-88
CODEN: AAASCO; ISSN: 0302-7368
DT Journal
LA English
AB The thermoresistance of the majority of spores exposed to acid treatment to remove Ca2+ corresponded practically to the original resistance of the spores. In the acid-treated spores, however, the super-resistant fraction, causing the tailing of the survival curve, was rarely found. The thermoresistance in the fraction of Ca acetate-treated spores, which

did not germinate or survive the treatment, substantially increased. Ca treatment caused in the majority of the spores a change similar to germination and this seems to support the hypothesis known as the expanded spore cortex theory. The kinetics of thermal death appeared practically the same in spores converted to their Ca2+ form as in spores grown on media rich in Ca. The difference in the thermoresistance of the H+ and Ca2+ form of spores remained unchanged during 6-month refrigerated storage of their suspension in water. The loss in ***dipicolinic*** ***acid*** was proportional to the ***germination*** and thermal death of the ***spores*** . The kinetics of dipicolinic acid exudation was nearly linear as a function of time.

L9 ANSWER 25 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1974:566145 CAPLUS
DN 81:166145
TI Relation between ***dipicolinic*** ***acid*** and ***germination*** in ***spores*** of Bacillus species
AU Holland, K. T.; Taylor, C. E.
CS Sch. Med., Univ. Leeds, Leeds, UK
SO Spore Res. 1973, [Proc. Br. Spore Group Meet.] (***1974***), Meeting Date 1972, 185-98. Editor(s): Barker, A. N. Publisher: Academic, London, Engl.
CODEN: 29AQA7
DT Conference
LA English
AB No correlations were found between the ***dipicolinic*** ***acid*** (***DPA***)content of ***spores*** and the rate of ***germination*** , the percent germination, or the necessity for heat activation. DPA:Ca++ ratios and Ca++ content did not correlate with the rate of germination, or percent germination. However, since DPA-neg. mutants of B. cereus would not germinate and had low concns. of both Ca++ and DPA, it is likely that DPA is required at a threshold value for the breaking of dormancy. This value depends on the species and germination environment. There was an indication that some germinants were more closely assocd. with disruption or alteration of Ca/DPA structures in the spore which leads to the breaking of dormancy, while other germinants may have different sites for their action.

L9 ANSWER 26 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1974:467 CAPLUS
DN 80:467
TI Effect of dipicolinic acid on the hemolysis of human red blood cells
AU Gupta, Krishan C.; Malik, Meena; Bhalla, V. K.
CS Dep. Microbiol., Panjab Univ., Chandigarh, India
SO Zentralblatt fuer Bakteriologie, Parasitenkunde, Infektionskrankheiten und Hygiene, Abteilung 1: Originale, Reihe A: Medizinische Mikrobiologie und Parasitologie (***1973***), 224(4), 523-6
CODEN: ZMMPAO; ISSN: 0300-9688
DT Journal
LA English
AB Dipicolinic acid [499-83-2] induced the hemolysis of human red blood cells, the degree of lysis being correlated with the concn. of dipicolinic acid and the incubation temp. The release of ***dipicolinic*** ***acid*** during ***spore*** ***germination*** of organisms

such as Bacillus is probably involved in the hemolytic activity of such spores.

L9 ANSWER 27 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1973:489416 CAPLUS
DN 79:89416
TI Release of dipicolinic acid and calcium and activation of Bacillus stearothermophilus spores as a function of time, temperature, and pH
AU Brown, M. R. W.; Melling, J.
CS Dep. Pharm., Univ. Aston, Birmingham, UK
SO Journal of Pharmacy and Pharmacology (***1973***), 25(6), 478-83
CODEN: JPPMAB; ISSN: 0022-3573
DT Journal
LA English
AB The kinetics of release of dipicolinic acid and Ca from B. stearothermophilus spores and the rate of increase of colony count are detd. by conditions of time, temp. and pH. The apparent activation energies for release of dipicolinic acid, Ca and colony count increase are similar. The results support the hypothesis that breaking of dormancy involves a rupture of dipicolinic acid bonds and that the nature of these bonds rather than the dipicolinic acid content dets. dormancy and resistance.

L9 ANSWER 28 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1974:117959 CAPLUS
DN 80:117959
TI Level of dipicolinic acid in the spores of Bacillus larvae and its effect on some of their enzyme systems
AU Kunchev, K.; Stoimenov, V.
CS Vet. Inst. Infect. Parasit. Dis., Sofia, Bulg.
SO Veterinarno-Meditsinski Nauki (***1973***), 10(7), 25-31
CODEN: VMDNAV; ISSN: 0324-1068
DT Journal
LA Bulgarian
AB The dipicolinic acid level in spores of B. larvae and its changes during the process of spore germination was detd. The level of the acid was 7.5-8.1% of the total dry wt. of the spores. No acid was present in the vegetative cells and it disappeared during germination. When a concn. of 0.05-1.0% was reached, inhibition occurred in the dehydrogenase, esterase, and phosphatase activities along with some changes in morphol.

L9 ANSWER 29 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1970:29109 CAPLUS
DN 72:29109
TI Microgermination of Bacillus cereus spores
AU Hashimoto, Tadayo; Frieben, W. R.; Conti, S. F.
CS Univ. of Kentucky, Lexington, KY, USA
SO Journal of Bacteriology (***1969***), 100(3), 1385-92
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA English
AB The biphasic nature of germination curves of individual B. cereus T spores was further characterized by assessing the effects of temp., concn. of germinants, and some inorg. cations on microgermination. Temp. was shown

to affect both phases of microgermination as well as the microlag period, whereas the concn. of L-alanine and supplementation with adenosine exerted a significant effect only on the microlag period. The germination curves of individual spores induced by inosine were also biphasic and resembled those of spores induced by L-alanine. High concns. (0.1M or higher) of Ca and other inorg. cations prolonged both phases of microgermination, particularly the 2nd phase, and had a less pronounced effect on the microlag period. The 2nd phase of microgermination was completely inhibited when spores wer e germinated either in the presence of 0.3M CaCl2 or at a temp. of 43.degree.; this inhibition was reversible. Observations on the germination of spore suspensions (kinetics of the release of dipicolinic acid and mucopeptides, loss of heat resistance, increase in stainability, decrease in turbidity and refractility) were interpreted on the basis of the biphasic nature of microgermination. Dye uptake by individual spores during germination appeared also to be a b iphasic process.

L9 ANSWER 30 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1969:45122 CAPLUS
DN 70:45122
TI Dipicolinate-induced germination of Bacillus stearothermophilus spores
AU Fields, Marion L.; Frank, Hilmer A.
CS Univ. of Hawaii, Honolulu, HI, USA
SO Journal of Bacteriology (***1969***), 97(1), 464-5
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA English
AB In the presence of di-Na dipicolinate (I), B. stearothermophilus spore germination was optimum at pH 5.5, a value at which I would be in doubly ionized form, dipicolinate anion being active. Dipicolinate-induced germination was inhibited by these cations in decreasing order: Co2+, Mn2+, Ca2+, and Mg2+, an order which corresponds directly to the size of the stability consts. for the resp. cation-dipicolinate chelates.

L9 ANSWER 31 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1968:416939 CAPLUS
DN 69:16939
TI Correlation between spore structure and spore properties in Bacillus megaterium
AU Rode, L. J.
CS Univ. of Texas, Austin, TX, USA
SO Journal of Bacteriology (***1968***), 95(6), 1979-86
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA English
AB The spores of six strains of B. megaterium were divided into 2 distinct groups on the basis of germination. Three of the strains germinated in a mixt. of L-alanine and inosine (AL type spores), and 3 strains germinated in a mixt. of glucose and KNO3 (GN type spores); recriprocal germination in the resp. solns. did not occur. The AL spores and the GN spores were morphologically distinct. Other differences between the 2 ***spore*** groups included ***germination*** inhibition characteristics, ***dipicolinic*** ***acid*** content, hexosamine content, P, and Mg content, spore coat features, ion exchange properties, and heat

resistance. A correlation appears to exist between spore morphology and certain other spore properties in strains of B. megaterium.

L9 ANSWER 32 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1968:47173 CAPLUS
DN 68:47173
TI Activation of Bacillus stearothermophilus spores and release of dipicolinic acid after hydrochloric acid treatment
AU Brown, Michael R. W.; Brown, M. W.; Porter, Gordon Scott
CS Bath Univ. Technol., Bath, UK
SO Journal of Pharmacy and Pharmacology (***1968***), 20(1), 80
CODEN: JPPMAB; ISSN: 0022-3573
DT Journal
LA English
AB Spore suspensions of B. stearothermophilus in the presence of 0.5N HCl at 25.degree. showed 97% germination in 30 min. along with the release of approx. half of the total dipicolinic acid (I). Apparently low pH initiates the effect of heat by releasing I without the lethal effects of heat. 6 references.

L9 ANSWER 33 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1967:471266 CAPLUS
DN 67:71266
TI Comparison of the germination and outgrowth of spores of Bacillus cereus and Bacillus polymyxa
AU Hamilton, William Allan; Stubbs, J. M.
CS Unilever Res. Lab., Bedford, UK
SO Journal of General Microbiology (***1967***), 47(1), 121-9
CODEN: JGMIAN; ISSN: 0022-1287
DT Journal
LA English
AB During germination of B. cereus spores, the cortex was lost completely, while with B. polymyxa spores there was no apparent alternation in the cortex structure. The quantities of dipicolinic acid, Ca, and mucopeptide (measured as hexosamine) released by the 2 types of spores during germination were similar, and it is suggested that only 30% of the mucopeptide of these species is involved in maintenance of spore dormancy. The solubilization of the spore dipicolinic acid, Ca, and mucopeptide during germination accounted for .apprx.50% of the loss of dry wt. from the spores. Electron microscopy showed that during the outgrowth of the B. cereus spore tube the spore coats dissolved away at one pole and the vegetative form grew outwards, leaving only fragments of the spore integument free in the medium. B. polymyxa grew when the largely unaltered coat and cortex layers of the spore split open at the bacterial equator.

L9 ANSWER 34 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1966:107139 CAPLUS
DN 64:107139
OREF 64:20247c-e
TI Sequence of events during Bacillus megaterium spore germination
AU Levinson, Hillel S.; Hyatt, Mildred T.
CS Pioneering Res. Div., U.S. Army Natick Labs., Natick, MA
SO Journal of Bacteriology (***1966***), 91(5), 1811-18

CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA English
AB An integrated investigation of the sequence of events during the germination of B. megaterium spores produced on 3 different media, Liver "B" (LB), synthetic, and Arret and Kirshbaum (A-K), is reported. Heat-activated spores were germinated in a mixt. of glucose and L-alanine. For studies of dipicolinic acid (DPA) release and increase in stainability and phase-darkening, germination levels were stabilized by the addn. of 2mM HgCl2. Heat resistance was measured by conventional plating techniques and by a new microscopic method. The sequence (50% completion time) of LB spore germination events was: loss of resistance to heat and to toxic chemicals (3.0 min.); DPA loss (4.7 min.); stainability and Klett-measured loss of turbidity (5.5 min.); phase-darkening (7.0 min.); and photometer measured loss of turbidity (7.2 min.). The time difference between 50% completion of stainability and complete phase darkening was 1.5 min., in excellent agreement with the microgermination time of 1.49 min. as detd. by observation of spores darkening under phase optics. Alteration of the sporulation medium modified the 50% completion times of these germination events, and, in some cases, their sequence. In the A-K medium spores the rates of loss of heat resistance and DPA were substantially higher than those of the other germination events, whereas in spores produced in the LB and synthetic media all germination events followed an approx. parallel time course. This is discussed from the point of view of spore population heterogeneity and germination mechanisms.

L9 ANSWER 35 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1966:69847 CAPLUS
DN 64:69847
OREF 64:13118b-c
TI Germination response of spores of Bacillus megaterium after exposure to calcium dipicolinate at 60.degree.
AU Jaye, Murray; Ordal, Z. John
CS Univ. of Illinois, Urbana
SO Canadian Journal of Microbiology (***1966***), 12(1), 199-201
CODEN: CJMIAZ; ISSN: 0008-4166
DT Journal
LA English
AB The spores germinated completely in 40 mM Ca dipicolinate at 24.degree. but not at 60.degree.. When the spores were exposed to Ca dipicolinate at 60.degree. then reincubated in a fresh soln. at 24.degree., they did not germinate. Spores suspended in water, in a soln. of NaCl, or Na dipicolinate soln. and exposed to 60.degree. germinated when resuspended in Ca dipicolinate at 24.degree.. When spores which failed to germinate in 40 mM Ca dipicolinate at 60.degree. were tested for germinal response to other germination stimulants (glucose, L-alanine, n-dodecylamine, Ca dipicolinate, or NaCl), they responded normally to all but the Ca dipicolinate stimulant. Spores heated in water germinated rapidly in the presence of this stimulant. Apparently, germination induced by Ca dipicolinate is different or entails different reactions as compared to germination induced by other germination stimulants.

L9 ANSWER 36 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN

AN 1965:411925 CAPLUS
DN 63:11925
OREF 63:2140c
TI The germination of spores of Bacillus megaterium: with special reference to calcium dipicolinate
AU Jaye, Murray
CS Univ. of Illinois, Urbana
SO (***1965***) 125 pp. Avail.: Univ. Microfilms (Ann Arbor, Mich.), Order No. 65-840
From: Dissertation Abstr. 25(8),4638
DT Dissertation
LA English
AB Unavailable

L9 ANSWER 37 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1965:426059 CAPLUS
DN 63:26059
OREF 63:4688g-h
TI Germination of spores of Bacillus megaterium with bivalent metal-dipicolinate chelates
AU Jaye, Murray; Ordal, Z. John
CS Univ. of Illinois, Urbana
SO Journal of Bacteriology (***1965***), 89(6), 1617-18
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA English
AB Rapid germination of B. megaterium spores was induced by 70-80mM Sr or Mg dipicolinate, compared with a requirement of 30mM for Ca dipicolinate. The increase in concn. of metal required for rapid germination, assocd. with the decrease in the stability const. of the chelate, and the lack of specificity for the metal, suggested that the initiating event of chelate-induced germination in physicochem. in nature.

L9 ANSWER 38 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1966:29353 CAPLUS
DN 64:29353
OREF 64:5475c-d
TI Changes in thermoresistance of Clostridium roseum as related to the intracellular content of calcium and dipicolinic acid
AU Wooley, Bennie C.; Collier, Robert E.
CS Univ. of Oklahoma, Norman
SO Canadian Journal of Microbiology (***1965***), 11, 279-85
CODEN: CJMIAZ; ISSN: 0008-4166
DT Journal
LA English
AB The Ca and dipicolinic acid contents were detd. throughout the sporulation and germination processes of C. roseum. Cell counts were made throughout both processes to relate the changes in the thermoresistant population with the changes in cellular Ca and dipicolinic acid. The Ca content ranged from 0.06 mg./100 mg. cells at 0 hr. to 0.616 mg./100 mg. cells (12 hrs.), and dipicolinic acid from 0 to 6.2 mg./100 mg. cells (at 12 hrs.) (The cell counts ranged from 2.3 .times. 105/ml. at 0 time to 5 .times. 108/ml. at 12 hrs.) Heat-resistant spores appeared at 7 hrs. when Ca and dipicolinic acid contents of cells were about 80-100% of max.

L9 ANSWER 39 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1964:40509 CAPLUS
DN 60:40509
OREF 60:7176c-d
TI Chemically defined, synthetic media for sporulation and for germination and growth of Bacillus subtilis
AU Donnellan, J. Edward, Jr.; Nags, Ella H.; Levinson, Hillel S.
CS Natick Labs., Natick, MA
SO Journal of Bacteriology (***1964***), 87(2), 332-6
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA Unavailable
AB From 90 to 130 mg. (dry wt.) of spores (.apprx.1% dark forms) were obtained (per 1.) from a chem. defined, synthetic medium, with a 2-phase (polyethylene glycol-K phosphate) harvest procedure. Optimal sporulation occurred when glucose and glutamic acid were at a concn. of 10 mM in the medium. Ca++ and Mn++ were required for sporulation. Heat resistance, ***dipicolinic*** ***acid*** content, and properties of ***germination*** and postgerminative development of ***spores*** grown in different concns. of Ca++ were investigated. Heat shock did not increase germination of spores derived from the synthetic medium. A synthetic medium, in which spore germination, emergence, and first cell division approached synchrony, was devised.

L9 ANSWER 40 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1963:28589 CAPLUS
DN 58:28589
OREF 58:4824g-h,4825a
TI Reversible activation for germination and subsequent changes in bacterial spores
AU Lee, W. H.; Ordal, Z. John
CS Univ. of Illinois, Urbana
SO Journal of Bacteriology (***1963***), 85, 207-17
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA Unavailable
AB It was possible to isolate refractile spores of Bacillus megaterium, from a Ca dipicolinate germination soln., that were activated and would germinate spontaneously in distd. water. Some of the characteristics of the initial phases of bacterial spore germination were detd. by studying these unstable activated spores. Activated spores of B. megaterium were resistant to stains and possessed a heat resistance intermediate between that of dormant and of germinated spores. The spontaneous germination of activated spores was inhibited by Cu, Fe, Ag, or Hg salts, satd. o-phenanthroline, or solns. having a low pH value, but not by many common inhibitors. These inhibitions could be partially or completely reversed by the addn. of Na dipicolinate. The activated spores could be deactivated and made similar to dormant spores by treatment with acid. Analyses of the exudates from the variously treated spore suspensions revealed that whatever inhibited the germination of activated spores also inhibited the release of spore material. The compn. of the germination exudates was different than that of exts. of dormant spores. Although heavy suspensions of activated spores gradually became swollen and dark

when suspended in solns. of o-phenanthroline or at pH 4, the materials released resembled those found in exts. of dormant spores rather than those of normal germination exudates.

L9 ANSWER 41 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1965:45679 CAPLUS
DN 62:45679
OREF 62:8144g-h,8145a
TI Electron transport in spore germination
AU Halvorson, Harlyn O.
CS Univ. of Wisconsin, Madison
SO Ann. Symp., Soc. Gen. Physiologists, 8th, Woods Hole, Mass. (***1963***), 1961, 3-26
DT Journal
LA English
AB Knowledge to date on metabolic activity of dormant state and governing control mechanisms in conversion from dormant state to vegetative cell is summarized. Specific points covered are metabolic activity of bacterial spores, O consumption, O data; comparison of enzyme constitution (qual. and quant.) of spore state and vegetative cells; electron transport, oxidative systems, comparison of spore state and vegetative cells; enzymic dormancy and activation; germination and phys. factors; identification of L-alanine binding sites with data (kinetics) on the DPNH oxidative role in L-alanine deamination; and evidence on the min. level of dipicolinic acid (DPA) necessary for recyclying DPNH to DPN in L-alanine deamination. DPA acting as electron acceptor (in conjunction with flavoprotein participation) accounts for increased respiratory activity from dormancy to vegetative states.

L9 ANSWER 42 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1962:485853 CAPLUS
DN 57:85853
OREF 57:17179a
TI Reversible calcium dipicolinate activation for germination and subsequent changes of Bacillus megaterium spores
AU Lee, Wei Hwa
CS Univ. of Illinois, Urbana
SO (***1962***) 83 pp. Avail.: Univ. Microfilms (Ann Arbor, Mich.), Order No. 62-2931
From: Dissertation Abstr. 23, 401
DT Dissertation
LA Unavailable
AB Unavailable

L9 ANSWER 43 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1962:451750 CAPLUS
DN 57:51750
OREF 57:10338a-c
TI Ionic and non-ionic compounds in the germination of spores of Bacillus megaterium Texas
AU Rode, L. J.; Foster, J. W.
CS Univ. of Texas, Austin
SO Archiv fuer Mikrobiologie (***1962***), 43, 201-12
CODEN: ARMKA7; ISSN: 0003-9276

DT Journal
LA English
AB cf. preceding abstr. Germination requirements of spore suspensions of the title organism, a L-alanine-inosine type, were examd. In deionized water L-alanine (I) and inosine (II) were devoid of germinative powers. They were effective only in conjunction with any one of a large variety of salts. Data are given for germination by the univalent and bivalent alkali metal chlorides. The K halides were germinative; KF was the best. Salts of org. acids, including fatty acids and polycarboxylic acids, were germinative. The need for II could be bypassed by various salts, e.g., NH4 propionate or salts of dipicolinic acid. I was replaceable by a variety of amino acids, provided suitable ions were present. In the presence of MgCl2, Na dipicolinate could substitute for either I or II, but not both. Salts of hexylamine and heptylamine bypassed the need for both I and II. A primary role for ions in germination was proposed and a secondary, augmentative action was attributed to I and II.

L9 ANSWER 44 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1962:48406 CAPLUS
DN 56:48406
OREF 56:9202a-c
TI Dipicolinic acid content, heat-activation, and the concept of dormancy in the bacterial endospore
AU Keynan, A.; Murrell, W. G.; Halvorson, H. O.
CS Univ. of Wisconsin, Madison
SO Nature (London, United Kingdom) (***1961***), 192, 1211-12
CODEN: NATUAS; ISSN: 0028-0836
DT Journal
LA Unavailable
AB The requirement for heat-activation of bacterial spores was related to the chem. compn. of the spore and the nature of the germinating agent employed. The amt. of heat-activation necessary (65.degree. in water) to give optimal alanine (I)-induced ***germination*** was linearly related to the ***spore*** content of ***dipicolinic*** ***acid*** (II). Effectiveness of cysteine as a germinating agent was identical to that observed with I. However, rate of germination in the presence of the Ca salt of II was not influenced by heatshock or by endogenous level of II. In all spore stocks there was no relation between amt. of II release and germination. Optimal germination occurred with about a 10% loss of II.

L9 ANSWER 45 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1959:40534 CAPLUS
DN 53:40534
OREF 53:7317h-i
TI The ionizing-radiation inactivation of bacterial spores
AU Woese, Carl R.
CS Yale Univ.
SO Journal of Bacteriology (***1959***), 77, 38-42
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA Unavailable
AB Spores which inactivate in a multiple-target fashion inactivate in a 2-target fashion, whereas spores which inactivate in a single-target

fashion inactivate in a single-target fashion upon germination. Spores of the multiple-target class seem to have a higher content of dipicolinic acid/g. of dry spore material than do those of the single-target class.

L9 ANSWER 46 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1958:98456 CAPLUS
DN 52:98456
OREF 52:17383h-i
TI Kinetics of the release of dipicolinic acid from spores of Bacillus subtilis
AU Woese, Carl; Morowitz, Harold J.
CS Yale Univ.
SO Journal of Bacteriology (***1958***), 76, 81-3
CODEN: JOBAAY; ISSN: 0021-9193
DT Journal
LA Unavailable
AB The kinetics of the release of ***dipicolinic*** ***acid*** from ***germinating*** ***spores*** of B. subtilis was studied. Such release correlates almost identically with the drop in optical d. observed upon spore germination. At a spore concn. of 93 .gamma./cc. the max. amt. of dipicolinic acid released during germination is 4.8 .gamma./cc. This amounts to 5.2% of the spore wt. as dipicolinic acid.

L9 ANSWER 47 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1957:57367 CAPLUS
DN 51:57367
OREF 51:10657a-d
TI Effect of duration of heating, L-alanine, and spore concentration on the oxidation of glucose by spores of Bacillus cereus var. terminalis
AU Murty, G. G. Krishna; Halvorson, H. Orin
CS Univ. of Illinois, Urbana
SO J. Bacteriol. (***1957***), 73, 235-40
DT Journal
LA Unavailable
AB The dormant glucose-oxidizing enzymes of resting, intact spores of B. cereus var. terminalis could be activated, in the absence of any detectable germination, by heating the spores at 65.degree. in the presence of small quantities of L-alanine. The enzymes could not be detected immediately after heat shock, but became active after incubation at room temp. for 40 to 45 min. L-alanine need not be present during this incubation. The amt. of enzymes so activated was a function of duration of heating, strength of spore suspension, and concn. of L-alanine. p-Fluorophenylalanine, if added along with L-alanine before heating, prevented activation of the enzymes. The activated enzymes were heat-labile, and alanine was partially destroyed during the process of activation. More enzymes could be activated by adding more alanine and heating the spores again. Partial release of the dipicolinic acid occurred during heat inactivation and subsequent incubation and oxidation of glucose. During nearly a year's storage in the wet state in the deep freeze, some changes occurred in the spores which permit the oxidative enzymes to be activated by heating in the absence of L-alanine.

L9 ANSWER 48 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1953:44955 CAPLUS

DN 47:44955
OREF 47:7592d-e
TI Isolation of dipicolinic acid (pyridine-2,6-dicarboxylic acid) from spores of Bacillus megatherium
AU Powell, Joan F.
CS Ministry Supply, Porton, Wiltshire, UK
SO Biochemical Journal (***1953***), 54, 210-11
CODEN: BIJOAK; ISSN: 0264-6021
DT Journal
LA Unavailable
AB Ca dipicolinate constitutes 50% of the solids excreted by germinating spores of B megatherium or about 15% of the spore dry wt. It has strong and characteristic ultraviolet absorption bands (.epsilon. 2700/.epsilon. 2775 = 1:2). It is suggested that the structure of the Ca salt may fit the compd. for a special role in the formation and maintenance of the resting spore.

L9 ANSWER 49 OF 66 CAPLUS COPYRIGHT 2003 ACS on STN
AN 1953:44954 CAPLUS
DN 47:44954
OREF 47:7592b-d
TI Biochemical changes occurring during the germination of bacterial spores
AU Powell, Joan F.; Strange, R. E.
CS Ministry Supply, Porton, Wiltshire, UK
SO Biochemical Journal (***1953***), 54, 205-9
CODEN: BIJOAK; ISSN: 0264-6021
DT Journal
LA Unavailable
AB Spores of lab. strains of Bacillus subtilis or B. megatherium, incubated with L-alanine or glucose, remain viable but rapidly lose their heat resistance and become more permeable to stains. It seems that the first thing that occurs in the spore germination process is the excretion of solid matter to the extent of about 30% of the spore dry wt. Resting spores have a very high sp. gr. of 1.46 and practically no metabolic activity. The material excreted consists chiefly of amino acids, peptides, hexoseamine attached to a nondialyzable peptide, also a substance which absorbs strongly in the ultraviolet (2625, 2700, and 2775 A). The latter is identified as dipicolinic acid. The glucoseamine-peptide compd., which appears very early in the development of the spore, may be derived from the spore integument.

L9 ANSWER 50 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
DUPLICATE 8
AN 1987:399880 BIOSIS
DN BA84:76060
TI GERMINATION AND HEAT RESISTANCE OF BACILLUS-SUBTILIS SPORES PRODUCED ON CLOVE AND EUGENOL BASED MEDIA.
AU BLANK G; AL-KHAYAT M; ISMOND M A H
CS DEP. FOOD SCI., UNIV. MANITOBA, WINNIPEG, CANADA.
SO FOOD MICROBIOL (LOND), (1987) 4 (1), 35-42.
CODEN: FOMIE5. ISSN: 0740-0020.
FS BA; OLD
LA English
AB Bacillus subtilis spores produced on trypticase soy and nutrient agar,

containing either 0.12% w/v clove powder or 0.02% v/v eugenol, were evaluated for germination and heat resistance. Spores produced in the presence of these compounds exhibited both a decrease in their rate and extent of germination when compared to control spores, regrdless of the temperature (25-48.degree. C) or pH (6.0-8.0) employed. When nutrient broth was replaced with trypticase soy broth as the germination medium, all treatment spores showed enhanced germination; the overall extent of germination, however, remained repressed. Washing the treatment spores with Tween 80 did not appreciably alter their rate of ***germination*** . All treatment ***spores*** contained lower levels of ***dipicolinic*** ***acid*** when compared to the control (7.9-8.7 and 9.8%, respectively). Heat resistance (D90.degree.C) was highest with spores produced on nutrient agar-clove (6.5 min) followed by nutrient agar-eugenol (6.0 min) and trypticase soy agar-clove (5.0 min). Spores produced on trypticase soy agar-eugenol and nutrient agar exhibited the same heat resistance (4.5 min).

L9 ANSWER 51 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
DUPLICATE 9
AN 1985:380947 BIOSIS
DN BA80:50939
TI ULTRASTRUCTURAL LOCALIZATION OF DIPICOLINIC-ACID IN DORMANT SPORES OF BACILLUS-SUBTILIS BY IMMUNOELECTRON MICROSCOPY WITH COLLOIDAL GOLD PARTICLES.
AU KOZUKA S; YASUDA Y; TOCHIKUBO K
CS DEP. MICROBIOL., NAGOYA CITY UNIV. MED. SCH., NAGOYA 467, JPN.
SO J BACTERIOL, (1985) 162 (3), 1250-1254.
CODEN: JOBAAY. ISSN: 0021-9193.
FS BA; OLD
LA English
AB The localization of dipicolinic acid in dormant spores of B. subtilis was examined by an immunoelectron microscopy method with colloidal gold-IgG complex. The colloidal gold particles were distributed mainly in the core regions of dormant spores and were not observed in those of ***germinated*** or autoclaved ***spores*** . This result clearly demonstrates that ***dipicolinic*** ***acid*** is localized in the cores of dormant spores.

L9 ANSWER 52 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
DUPLICATE 11
AN 1977:155221 BIOSIS
DN BA63:50085
TI EFFECT OF CALCIUM HYPO CHLORITE ON BACILLUS-ANTHRACOIDES SPORES.
AU GALANINA L A; MARCHENKO I V; SKVORTSOVA E K; KAZANSKAYA T B; BEKHTEREVA M N
SO MIKROBIOLOGIYA, (1976) 45 (3), 515-519.
CODEN: MIKBA5. ISSN: 0026-3656.
FS BA; OLD
LA Unavailable
AB A sublethal dose of calcium hypochlorite (CH) of 0.2-0.3 mg/ml active Cl did not cause, after 5 min, morphological changes in the spores of B. anthracoides which could be detected by phase contrast microscopy or a decrease in the content of dipicolinic acid (DPA) in the spores. Further cultivation of the spores treated with the sublethal dose of CH on DPA

resulted in a delay of changes which were typical of normal germination process (swelling, loss of light refraction, decrease in DPA content). The action of a lethal dose of CH (0.2-0.3 mg/ml active Cl during 1.5 h or 5.6 mg/ml active Cl during 1 h) causes a decrease in light refraction, changes in the dimensions of spores and a decrease in the content of DPA in the spores by a factor of 4-5. A sharp decrease in the content of ***DPA*** in the ***spores*** may characterize not only their ***germination*** but also their death caused by lethal doses of the Cl-containing disinfectant.

L9 ANSWER 53 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
AN 1987:150097 BIOSIS
DN BA83:79147
TI INVOLVEMENT OF THE SPORE COAT IN GERMINATION OF BACILLUS-CEREUS T SPORES.
AU KUTIMA P M; FOEGEDING P M
CS DEP. FOOD SCI., N.C. STATE UNIV., RALEIGH, N.C. 27695-7624.
SO APPL ENVIRON MICROBIOL, (1987) 53 (1), 47-52.
CODEN: AEMIDF. ISSN: 0099-2240.
FS BA; OLD
LA English
AB Bacillus cereus T spores were prepared on fortified nutrient agar, and the spore coat and outer membrane were extracted by 0.5% sodium dodecyl sulfate-100 mM dithiothreitol in 0.1 M sodium chloride (SDS-DTT) at pH 10.5 (coat-defective spores). Coat-defective spores in L-alanine plus adenosine germinated slowly and to a lesser extent than spores not treated with SDS-DTT, as determined by decrease in absorbance and release of ***dipicolinic*** ***acid*** and Ca2+. ***Spores*** ***germinated*** in calcium dipicolinate only after treatment with SDS-DTT. Biphasic and triphasic germination kinetics were observed with normal and coat-defective spores, respectively, in an environment with temperature increasing from 20 to 65.degree. C at a rate of 1.degree. C/min. Therefore, the physical and biochemical processes involved in germination are modified by coat removal. The data suggest that a portion of the germination apparatus located interior to the coat may be protected by the coat and outer membrane or that the coat and outer membrane otherwise enhance germination in L-alanine plus adenosine. When coat-defective spores were heat activated with the dialyzed (12,000-Mr cutoff) components extracted from the spores, germination of the SDS-DTT-treated spores was enhanced; thus, one or more components located in the spore coat or outer membrane with a molecular weight > 12,000 were essential for fast germination.

L9 ANSWER 54 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
AN 1985:437843 BIOSIS
DN BA80:107835
TI CHANGES IN THE CONTENT OF AMINO-ACIDS AND MINERAL ELEMENTS AND IN THE ACTIVITY OF SOME ENZYMES IN GERMINATING SPORES OF BACILLUS-THURINGIENSIS.
AU ALEKSEEV A N; KARABANOVA L N; KRAINOVA O A; KRASOV E S; KASHPAROVA E V; PAKHTUEV A I; SHEVTSOV V V
CS ALL-UNION RES. INST. APPL. MICROBIOL., OBOLENSK, USSR.
SO MIKROBIOLOGIYA, (1985) 54 (2), 181-185.
CODEN: MIKBA5. ISSN: 0026-3656.
FS BA; OLD
LA Russian

AB Changes in the content of dipicolinic acid and mineral elements were studied in the process of B. thuringiensis spore ***germination*** . The ***spores*** released .ltoreq. 28% of ***dipicolinic*** ***acid*** and 18% of calcium at the activation stage, and 93 and 91%, respectively, at the initiation stage. At the same time, the content of Mg, Mn, Zn and P decreased while K, Na and Fe accumulated in the spores. The activities of total and serine proteases, alkaline phosphatase, NADH dehydrogenase and aldolase increased in the extract of initiated spores. The content of glutamate decreased in the free amino acid pool as early as by the 30th s of the initiation stage.

L9 ANSWER 55 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
AN 1983:263956 BIOSIS
DN BA76:21448
TI EFFECT OF INHIBITORS OF TRYPSIN-LIKE PROTEOLYTIC ENZYMES ON BACILLUS-CEREUS T SPORE GERMINATION.
AU BOSCHWITZ H; MILNER Y; KEYNAN A; HALVORSSON H O; TROLL W
CS DEP. BIOL. ROSENSTIEL BASIC MED. SCI. RES. CENT., BRANDEIS UNIV., WALTHAM, MASS. 02254.
SO J BACTERIOL, (1983) 153 (2), 700-708.
CODEN: JOBAAY. ISSN: 0021-9193.
FS BA; OLD
LA English
AB The germination of B. cereus T spore suspensions is partially prevented by several inhibitors of trypsin-like enzymes. Leupeptin, antipain and tosyllysine-chloromethyl ketone are effective inhibitors; chymostatin, elastinal and pepstatin are inactive. A synthetic substrate of trypsin, tosyl-arginine-methyl ester, also inhibits germination. Its inhibitory effect decreases as a function of incubation time in the presence of spores and is abolished by previous hydrolysis with trypsin. Germinating, but not dormant, spore suspensions hydrolyze tosyl-arginine-methyl ester; its hydrolysis is insensitive to chloramphenicol, sulfhydryl reagents and EDTA. A crude extract of germinated B. cereus spores contains a trypsin-like enzyme whose activity, as measured by hydrolysis of benzoyl-arginine p-nitroanilide, is sensitive to germination-inhibitory compounds such as leupeptin, tosyl-arginine-methyl ester and tosyl-lysine-chloromethyl ketone. Spore suspensions exposed to the above inhibitors under germination conditions lose only part of their heat resistance and some 10-30% of their ***dipicolinic*** ***acid*** content. Part of the ***germinating*** ***spore*** population becomes phase grey under phase optics. Based on a study of the inhibition of germination by protease inhibitors and the activity of a protease in germination spores and spore extracts, it is suggested that the activity of a trypsin-like enzyme may be involved in the mechanism of the breaking of doramncy in spores of B. cereus T.

L9 ANSWER 56 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
AN 1984:205225 BIOSIS
DN BA77:38209
TI LOW TEMPERATURE ACTIVATION OF SPORES IN THERMOACTINOMYCES-SPP.
AU KOKINA V YA; EVTUSHENKO L I; AGRE N S
CS INST. BIOCHEM. PHYSIOL. MICROORG., ACAD. SCI. USSR, PUSHCHINO, USSR.
SO MIKROBIOLOGIYA, (1983) 52 (1), 158-160.
CODEN: MIKBA5. ISSN: 0026-3656.

FS BA; OLD
LA Russian
AB Changes in the content of dipicolinic acid (DPA) at low-temperature activation and initiation of spores in Thermoactinomyces spp. were studied and thermoresistance of spores activated by cooling was investigated. The spores did not lose thermoresistance after being subjected to low temperatures and did not release ***DPA*** . Low-temperature activation of ***spore*** ***germination*** did not result in the initiation of the spores and was similar, in the results, to the activation by a heat shock or by other activating agents.

L9 ANSWER 57 OF 66 BIOSIS COPYRIGHT 2003 BIOLOGICAL ABSTRACTS INC. on STN
AN 1981:284217 BIOSIS
DN BA72:69201
TI GERMINATION OF BACILLUS-MEGATERIUM QM-B-1551 SPORES WITH CADMIUM CHLORIDE.
AU IMAGAWA M; KITAGAWA H; ICHIKAWA T; KONDO M
CS FAC. PHARM. SCI., OSAKA UNIV., YAMADA-KAMI 133-1, SUITA, OSAKA 565.
SO JPN J BACTERIOL, (***1980 (RECD 1981)***) 35 (6), 747-752.
CODEN: NSKZAM. ISSN: 0021-4930.
FS BA; OLD
LA Japanese
AB B. megaterium QM B 1551 spores were germinated by the addition of 5 mM CdCl2. Ca and ***dipicolinic*** ***acid*** were released from ***germinated*** ***spores*** . ***Spores*** lost their heat resistance when ***germinated*** with glucose and KNO3. O.D. (optical density) during the CdCl2-induced germination was less than half that seen during germination with glucose and KNO3. Spores germinated by the addition of CdCl2 failed to incorporate leucine and to consume O2. The 1st step in the process of germination may have occurred without any subsequent steps.

L9 ANSWER 58 OF 66 LIFESCI COPYRIGHT 2003 CSA on STN
AN 83:56607 LIFESCI
TI Low-temperature activation of spores in Thermoactinomyces species.
AU Kokina, V.Ya.; Yevtushenko, L.I.; Agre, N.S.
CS Address not stated
SO MIKROBIOLOGIYA., (***1983***) vol. 52, no. 1, pp. 158-160.
DT Journal
FS J
LA Russian
SL English; Russian
AB The work was aimed at studying changes in the content of dipicolinic acid (DPA) at low-temperature activation and initiation of spores in two Thermoactinomyces species as well as at investigating thermoresistance of spores activated by cooling. The spores did not lose thermoresistance after being subjected to low temperatures and did not release ***DPA*** . Low-temperature activation of ***spore*** ***germination*** did not result in the initiation of the spores and was similar, in the results, to the activation by a heat shock or by other activating agents.

L9 ANSWER 59 OF 66 FSTA COPYRIGHT 2003 IFIS on STN
AN 1985(02):B0014 FSTA
TI Influence of heat and radiation on the germinability and viability of B. cereus BIS-59 spores.

AU Kamat, A. S.; Lewis, N. F.
CS Biochem. & Food Tech. Div., Bhabha Atomic Res. Cent. Trombay, Bombay-400 085, India
SO Indian Journal of Microbiology, (***1982***), 23 (1) 198-202, 14 ref.
DT Journal
LA English
AB Spores of Bacillus cereus BIS-59, isolated from shrimps, exhibited an exponential gamma radiation survival curve with a D.sub.1.sub.0 value of 400 krad as compared with a D.sub.1.sub.0 value of 30 krad for the vegetative cells. The D.sub.1.sub.0 value of dipicolinic acid (DPA)-depleted spores was also 400 krad indicating that DPA does not influence the radiation response of these spores. Max. germination monitored with irradiated spores was 60% as compared with 80% in case of unirradiated spores. Radiation-induced inhibition of the germination processes was not dose dependent. Heat treatment (15 min at 80.degree. C) of spores resulted in activation of the germination process; however, increase in heating time (30 min and 60 min) increased the ***germination*** lag period. ***DPA*** -depleted ***spores*** were less heat resistant than normal spores and exhibited biphasic exponential inactivation.

L9 ANSWER 60 OF 66 FSTA COPYRIGHT 2003 IFIS on STN
AN 1971(12):B0130 FSTA
TI Effect of EDTA on the germination of and outgrowth from spores of Clostridium botulinum 62-A.
AU Winarno, F. G.; Stumbo, C. R.; Hayes, K. M.
CS Dept. of Food Sci. & Tech., Univ., Amherst, Massachusetts 01002, USA
SO Journal of Food Science, (***1971***), 36 (5) 781-785, 8 ref.
DT Journal
LA English
AB EDTA, in concn. >2.5 mM, was found inhibitory to germination of and outgrowth from spores of Cl. botulinum Type A and to toxin production in a fish homogenate. Inhibitory action was influenced by pH of the medium in the range pH 6.5-8.1, the action increasing with pH. It was influenced by Mg and Ca conc. in the medium, equimolar concn. of added CaCl.sub.2 or MgCl.sub.2 completely erasing the growth inhibitory action. Initial spore concn. also influenced inhibitoty efficacy - the higher the spore concn., the higher the EDTA concn. required for inhibition. There was no evidence that EDTA, in any concn. used, promoted ***spore*** ***germination*** . Release of Ca, Mg and ***dipicolinic*** ***acid*** from incubating spores was suppressed to varying extents by 5.0 and 10 mM EDTA.

L9 ANSWER 61 OF 66 CABA COPYRIGHT 2003 CABI on STN
AN 86:97008 CABA
DN 860412132
TI Studies on the antibiotic nisin produced by Streptococcus lactis IFO 12007. II. Activity of nisin against vegetative microbes and spore germination
AU Lee, S. H.; Kim, H. U.
CS Food Res. Inst., Agric. Fishery Development Corp., Banweol, Hwaseong, Kyonggi 170-31, Korea Republic.
SO (***1985***) pp. 1127-1129. 15 ref.
Publisher: The Organizing Committee. Seoul

Meeting Info.: Proceedings of the 3rd AAAP Animal Science Congress, May 6-10, 1985. Volume 2.
CY KOREA REPUBLIC
DT Conference Article
LA English
AB Nisin at 200 IU/ml completely prevented growth of Lactobacillus bulgaricus, L. casei, L. plantarum, Streptococcus thermophilus, L. helveticus, L. acidophilus, Bacillus subtilis, B. megaterium, B. coagulans and S. aureus, and significantly decreased germination of B. subtilis LDTM1 spores (to 4-15%, depending on germinating agent used). The pattern of release of ***dipicolinic*** ***acid*** from ***spores*** indicated that nisin delayed ***germination*** and prevented the outgrowth of the spores. The heat resistance of B. subtilis spores in reconstituted dried skim milk decreased progressively as nisin concn. was increased from 50 to 100 micro g/ml. At 50 or 100 micro g/ml in pasteurized milk, nisin prevented the increase in spore counts of B. subtilis during storage for 32 days at 4 deg C or 12 days at 25 deg C.

L9 ANSWER 62 OF 66 DRUGB COPYRIGHT 2003 THOMSON DERWENT on STN
AN 1972-17355 DRUGB M
TI ***GERMINATION*** OF BACTERIAL ***SPORES*** BY CALCIUM CHELATES OF ***DIPICOLINIC*** ***ACID*** ANALOGUES.
AU LEWIS J C
LO BERKELEY,CAL.
SO J.BIOL.CHEM. (247, NO.6, 1861-68, ***1972***)
DT Journal

L9 ANSWER 63 OF 66 DRUGU COPYRIGHT 2003 THOMSON DERWENT on STN
AN 1987-49364 DRUGU M V
TI Studies on Nicotinic Acid and Some of Its Derivatives on Growth and Sporulation of Bacilli.
AU Kalita D K; Singh R P
LO Jorhat, India
SO Curr.Sci. (56, No. 16, 815-17, 1987) 1 Fig. 3 Tab. 16 Ref.
CODEN: CUSCAM ISSN: 0011-3891
AV Biochemistry Division, Regional Research Laboratory, Jorhat 785 006, India.
LA English
DT Journal
FA AB; LA; CT
FS Literature
AN 1987-49364 DRUGU M V
AB Nicotinic acid (NA) did not inhibit the growth nor sporulation in vitro of Bac. cereus and megaterium. Methyl (MN) and ethyl nicotinates (EN) inhibited sporulation, utilization and polybetahydroxybutyrate (PHB) synthesis/utilization without affecting growth. Nicotinamide (NAM) produced heat labile spores with depleted dipicolinic acid (DPA). The effects of NAM were restored by addition of exogenous DPA. A model was proposed depicting possible sites of action of NA derivatives during growth and sporulation of bacilli.
ABEX NA did not inhibit growth or sporulation of B. cereus T and B. megaterium QM B1551. MN and EN specifically inhibited sporulation, utilization of organic acids and PHB synthesis/accumulation without affecting growth. Similar results were seen with ethyl picolinates but these were reversed

by Fe2+. EN inhibition was not reversed by metals, amino acids, vitamins or TCA intermediates alone or in combination. EN treated cultures accumulated organic acids. In vitro studies on cell free extracts of B. cereus suggested that EN inhibited citrate synthase and aconitase. NAM did not affect growth, sporulation, organic acid utilization or PHB accumulation/synthesis but produced more than 95% heat labile spores with only 10.85% of the maximum amount of ***DPA*** . These ***spores*** ***germinated*** poorly (15-20%) and ***germination*** ability was totally lost on storage at 4 deg for 2 mth. NAM effects were restored by addition of exogenous DPA with NAM. (W91/WS) (R.P.S.).

L9 ANSWER 64 OF 66 FROSTI COPYRIGHT 2003 LFRA on STN
AN 356770 FROSTI
TI Caffeic acid activity against Clostridium botulinum spores.
AU Bowles B.L.; Miller A.J.
SO Journal of Food Science, ***1994*** , 59 (4), 905-908 (36 ref.)
DT Journal
LA English
SL English
AB Although the naturally occurring caffeic acid is known to have antimicrobial activity, little information is available on its use as a food additive. The activity of caffeic acid against Clostridium botulinum ***spores*** was determined. ***Germination*** rates, ***dipicolinic*** ***acid*** release, ***spore*** thermal resistance and vegetative cell toxigenesis were determined. Caffeic acid was shown to reduce spore thermal resistance and to inhibit C. botulinum toxigenesis. Sporostatic activity was retained when tested in commercial meat broths. Caffeic acid thus had potential as a food additive to inhibit growth of C. botulinum and reduce thermal processing requirements of heat-sensitive foods.

L9 ANSWER 65 OF 66 KOSMET COPYRIGHT 2003 IFSCC on STN
AN 24770 KOSMET FS scientific, technical
TI ANALYSIS OF THE KILLING OF SPORES OF BACILLUS SUBTILIS BY A NEW DISINFECTANT, STERILOX R
AU LOSHON C A (DEPARTMENT OF BIOCHEMISTRY, UNIVERSITY OF CONNECTICUT HEALTH CENTER, FARMINGTON, CT, USA); MELLY E; SETLOW B; SETLOW P
SO J APPL MICROBIOL, 2001, 91 (6), 1051-1058 36 REFS
Availability: P SETLOW, DEPARTMENT OF BIOCHEMISTRY, UNIVERSITY OF CONNECTICUT HEALTH CENTER, FARMINGTON, CT 06032, USA (e-mail: setlow@sun.uchc.edu)
DT Journal
LA English
AB Aims: To determine the mechanism whereby the new disinfectant SteriloxR kills spores of Bacillus subtilis. Methods and Results: Bacillus subtilis spores were readily killed by Sterilox and spore resistance to this agent was due in large part to the spore coats. Spore killing by Sterilox was not through DNA damage, released essentially no spore dipicolinic acid and Sterilox-killed spores underwent the early steps in ***spore*** ***germination*** , including ***dipicolinic*** ***acid*** release, cortex degradation and initiation of metabolism. However, these germinated spores never swelled and many had altered permeability properties. Conclusions: We suggest that Sterilox treatment kills dormant spores by oxidatively modifying the inner membrane of the spores such

that this membrane becomes non-functional in the germinated spore leading to spore death. Significance and Impact of the Study: This work provides information on the mechanism of spore resistance to and spore killing by a new disinfectant

=> d 66

L9 ANSWER 66 OF 66 PROMT COPYRIGHT 2003 Gale Group on STN

ACCESSION NUMBER: 95:120454 PROMT
TITLE: CAFFEIC ACID EFFECTIVE AGAINST C. BOTULINUM, RESEARCHERS REPORT
SOURCE: Food Chemical News, (***20 Feb 1995***) pp. N/A.
ISSN: 0015-6337.
LANGUAGE: English
WORD COUNT: 594
FULL TEXT IS AVAILABLE IN THE ALL FORMAT

=> d all 66

L9 ANSWER 66 OF 66 PROMT COPYRIGHT 2003 Gale Group on STN

AN 95:120454 PROMT
TI CAFFEIC ACID EFFECTIVE AGAINST C. BOTULINUM, RESEARCHERS REPORT
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TX Caffeic acid has potential as a food additive to inhibit growth of Clostridium botulinum spores and reduce the thermal processing requirements of heat sensitive foods, according to researchers.

Bobby Bowles and Arthur Miller, with the Department of Agriculture's Agricultural Research Service in Philadelphia, tested caffeic acid against C. botulinum, assessing its effect on ***germination*** rates, ***dipicolinic*** ***acid*** release, ***spore*** thermal resistance, and vegetative cell toxigenesis.

At 0.78 and 3.25 mM, caffeic acid inhibited germination for six and 24 hours, respectively, with more than 100 mM required to render spores nonviable. Concentrations of at least 50 mM reduced 80xC spore thermal resistance. Sporostatic activity was retained when tested in commercial meat broths, and 5.0 mM caffeic acid delayed toxigenesis, according to results reported in the July-August 1994 issue of the Journal of Food Science.

Water Can Safely Be Reused in Pork Processing Plants

Water that has been reconditioned and chlorinated can be reused as an alternative to potable water in initial slaughter operations without diminishing bacteriologic safety, according to another report in the same issue.

Noting that waste discharge restrictions and water shortages have raised interest in reusing water in pork processing plants, A.J. Miller and colleagues, USDA-ARS, Philadelphia, and A. Oser and J.L. Hallman, Hatfield Quality Meats, Hatfield, Pa., set out to determine if the use of reconditioned water would alter the microbiological flora of swine carcasses in a pork processing plant.

No differences were observed for staphylococci, enterics, fecal streptococci, Listeria monocytogenes, coliforms, and Aeromonas levels. A preevisceration potable water carcass wash reduced the bacterial load regardless of initial treatment. Bacterial counts on carcasses paralleled those in water, they reported.

ARS Broth Model Validated But Researchers Urge Caution in Use

Researchers who tested a modeling study validated its usefulness for predicting survival rates of L. monocytogenes in some meat products, but they cautioned that modeling studies should be used only to acquire first estimates of the likely behavior of pathogens, and that additional studies are needed before models can be relied upon for accurate predictions.

In a study reported in the same issue, R.C. Whiting, USDA-ARS, Philadelphia, and M.O. Masana, Instituto de Technologia de Carnes, Buenos Aires, Argentina, set out to help validate a previously reported modeling study for L. monocytogenes and evaluate the effects of pH and nitrite in circumstances closer to those of an actual uncooked, fermented meat product.

Many ready-to-eat meat products are uncooked, including prosciutti, Westphalian hams, pepperoni and some salami, and L. monocytogenes is a bacterial hazard in such products, they explained.

The researchers determined L. monocytogenes survival in meat batters where the pH was controlled and the

microorganisms were added immediately after the nitrite, simulating contamination of the product from the plant environment.

While they concluded that the survival model was validated in simulated uncooked-fermented meat products for effects of nitrite and pH, the researchers observed several effects that differed from those predicted by the model.

Microbial Populations in Apple Cider Studied

In the September-October issue of the same journal, Spanish researchers reported on microbial populations in cider prepared by two different techniques.

M. Due$as and colleagues, of the Universidad del Pais Vasco in San Sebastian, Spain, examined the major types of naturally occurring yeasts and lactic acid bacteria in cider, and studied the role of LAB in spoilage and malolactic fermentation.

Noting that the use of lower pH musts resulted in lower counts of the Lactobacillus species, as well as control of the LAB populations, the authors recommended using a higher proportion of acidic apples in cider making.

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